OFFICE OF ENVIRONMENTAL QUALITY CONTROL
BUREAU OF LAND AND WASTE MANAGEMENT
POST-CLOSURE CARE HAZARDOUS WASTE PERMIT

Permit Number SCD 003 345 683

Issue Date: April 2, 2013 Effective Date: May 2, 2013
Expiration Date: May 2, 2023

This Permit is hereby issued to:

Administrative Owner/Operator: Timken US LLC
Facility Contact: Alan Oberster, Timken Company, Canton Ohio

Operator of Remediation Systems: Ingersoll Rand Company
Facility Contact: Mr. David Sordi, Center Conway, NH Phone: (603) 447-3516

Address: 1775 Torrington Road, Clinton, SC 29325

This Permit is for the post-closure care of one waste management area consisting of seven former hazardous waste management units and identification, investigation and corrective action for solid waste management units (SWMUs) located at Old Laurens Road, Clinton, Laurens County, South Carolina.

This permit is issued pursuant to Section 44-56-10 et seq. Regulation 61-79 of the 1976 South Carolina Code of Laws, as amended. The authority granted hereunder is subject to the requirements of the aforementioned laws and regulations and the following condition.

Richard A. Haynes, P.E. Director
Division of Waste Management
Bureau of Land and Waste Management

This permit is the property of the Bureau of Land and Waste Management and must be surrendered on demand. This signature page must be posted at all times in a conspicuous place on the premises.

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MODULE I- STANDARD CONDITIONS

I.A. EFFECT OF PERMIT

The Permittee shall perform post-closure care on the former hazardous waste management units in accordance with the conditions of this permit. Any storage, treatment, and/or disposal of hazardous waste not authorized in this permit or otherwise authorized by applicable rule or law is prohibited. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringements of state or local law or regulations. Compliance with the permit conditions constitutes compliance, for purpose of enforcement, with Subtitle C of RCRA in accordance with R.61-79.270.4. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under Sections 3008(a), 3008(h), 3913, or 7003 or RCRA; Sections 106(a), 104, or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 960) et seq., commonly known as CERCLA, or any other law providing for the protection of public health or the environment. [R.61-79.270.4, 270.30(g)]

I.B. PERMIT ACTIONS

I.B.1. Permit Modification, Revocation and Reissuance, and Termination

This permit may be modified, revoked and reissued, or terminated for cause as specified in R.61-79.270.41, 270.42, 270.43 in accordance with the requirements of R.61-79.124.5. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes or anticipated non-compliance on the part of the Permittee does not stay the applicability or enforceability of any permit condition. [R.61-79.270.30(f)]

I.B.2. Permit Renewal

This permit may be renewed as specified in R.61-79.270.30(b) and Permit Condition I.E.2. Review of any application for a permit renewal shall consider improvements in the state of control and measurement technology, as well as changes in applicable regulations. [R.61-79.270.30(b)]

I.B.3 Permit Expiration

Pursuant to R.61-79.270.50, this Permit shall be effective for a fixed term not to exceed ten (10) years. This Permit and all Conditions herein will remain in effect beyond the permit's expiration date, if the Permittee has submitted a timely, complete application (see R.61-79.270.10, 270.13 through 270.29) and through no fault of the Permittee, the Department has not issued a new permit, as set forth in R.61-79.270.51.

I.C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

I.D. **DEFINITIONS**

For purposes of this permit, terms used herein shall have the same meaning as those in R.61-79 Parts 124, 260, 264, 266, 268, and 270 unless this permit specifically provides otherwise; where terms are not defined in the regulations or the permit, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term. "Department" means the South Carolina Department of Health and Environmental Control, or his/her designee or authorized representative.

I.D.1 "Action levels" for the purposes of this permit are health-based concentrations of hazardous constituents determined to be indicators for the protection of human health and/or the environment.

I.D.2 "Area of Concern (AOC)" for purposes of this permit includes any area having a probable release of a hazardous waste or hazardous constituent which is not from a solid waste management unit and is determined by the Department to pose a current or potential threat to human health or the environment. Such areas of concern may require investigations and remedial action as required under Section 3005(C)(3) of the Resource Conservation and Recovery Act and R.61-79.270.32(b)(2) in order to ensure adequate protection of human health and the environment.

I.D.3 “Certified Lab” for the purposes of this Permit means a laboratory that has been approved by the Department to perform specific analyses referenced in R.61-79.260 through R.61-79.270.

I.D.4 "Contamination" for purposes of this permit refers to the presence of any hazardous constituent in a concentration which exceeds the naturally occurring concentration of that constituent in areas not impacted by facility activities.

I.D.5 "Corrective Action" for purposes of this permit, may include all corrective measures necessary to protect human health and the environment for all releases of hazardous waste or hazardous constituents at the facility, regardless of the time at which waste was placed in the unit, as required under R.61-79.264.100(b) and 264.101. Corrective measures may address releases to air, soils, surface water, groundwater, or subsurface gases.

I.D.6 "Corrective Action Management Unit" (CAMU) for purposes of this permit, includes any area within a facility that is designated by the Department under part 264 Subpart S, for the purpose of implementing corrective action requirements under R.61-79.264.101 and RCRA section 3008(h). A CAMU shall only be used for the management of remediation

wastes pursuant to implementing such corrective action at the facility.

I.D.7 "Extent of Contamination" for the purposes of this permit is defined as the horizontal and vertical area in which the concentrations of hazardous constituents in the environmental media being investigated are above detection limits or background concentrations indicative of the region, whichever is appropriate as determined by the Department.

I.D.8 "Facility" for the purposes of this permit includes all contiguous land, and structures, other appurtenances, and improvements on the land, used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (e.g. one or more landfills, surface impoundments or combination of them). For the purposes of implementing corrective action under R.61-79.264.101, a facility includes all contiguous property under the control of the owner or operator seeking a permit under Subtitle C of RCRA.

I.D.9 "Hazardous constituents" for purposes of this permit are those substances listed in Appendix VIII of R.61-79.261 and Appendix IX of R.61-79.264.

I.D.10 A "hazardous waste management unit (HWMU)" for purposes of this permit is a contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is a significant likelihood of mixing hazardous waste constituents in the same area. Examples of hazardous waste management units include a surface impoundment, a waste pile, a land treatment area, a landfill cell, an incinerator, a tank and its associated piping and underlying containment system, and a container storage area. A container alone does not constitute a unit; the unit includes containers and the land or pad upon which they are placed.

I.D.11 "Interim Measures" for the purposes of this permit are actions necessary to minimize or prevent the further migration of contaminants and limit actual or potential human and environmental exposure to contaminants while long-term corrective action remedies are evaluated and, if necessary, implemented.

I.D.12 "Land Disposal" for the purposes of this permit and R.61-79.268 means placement in or on the land except for a CAMU and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, underground mine or cave, or concrete vault or bunker intended for disposal purposes.

I.D.13 "Landfill" for the purposes of this permit includes any disposal facility or part of a facility where hazardous waste is placed in or on the land and which is not a pile, a land treatment facility, a surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, underground mine, a cave or a corrective action management unit.

I.D.14 "Release" for purposes of this permit includes spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of any hazardous waste or hazardous constituents.

I.D.15 "Remediation Waste" for the purposes of this permit includes all solid and hazardous wastes, and all media (including groundwater, surface water, soils, and sediments) and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action requirements under R.61-79.264.101 and RCRA section 3008(h). For a given facility, remediation wastes may originate only from within the facility boundary, but may include waste managed in implementing RCRA sections 3004(v) or 3008(h) for releases beyond the facility boundary.

I.D.16"Solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials, including soil, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under Section 402 of the Federal Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or byproduct material (as defined by the Atomic Energy Act of 1954, as amended (86 Stat. 923)).

I.D.17"Solid Waste Management Unit (SWMU)" for purposes of this permit includes any unit which contains or has contained solid waste at any time, irrespective of whether the unit is or ever was intended for the management of solid waste.

I.D.18 A "Temporary Unit" (TU) for purposes of this permit includes any temporary tanks and/or container storage areas used solely for treatment or storage of hazardous remediation wastes during specific remediation activities. Designated by the Department, such units must conform to specific standards, and may only be in operation for a period of time as specified in this permit.

I.D.19 A "Unit" for purposes of this permit includes, but is not limited to, any landfill, surface impoundment, waste pile, land treatment unit, incinerator, injection well, tank, container storage area, septic tank, drain field, spray irrigation field, wastewater treatment unit, elementary neutralization unit, transfer station or recycling unit.

I.E. **DUTIES AND REQUIREMENTS**

I.E.1. Duty to Comply

The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such non-compliance is authorized by an emergency permit. Any permit non-compliance, other than non-compliance authorized by an emergency permit, constitutes a violation of RCRA and the South Carolina Hazardous Waste Management Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application. [R.61-79.270.30(a)]

I.E.2. Duty to Reapply

If the Permittee wishes to continue an activity allowed by this permit after the expiration date of this permit, the Permittee shall submit a complete application for a new permit at least one hundred eighty (180) days prior to permit expiration unless otherwise agreed to by the Department. [R.61-79.270.10(h), 270.30(b)]

I.E.3. Obligation for Corrective Action

The Permittee is required to continue this permit for any period necessary to comply with the corrective action requirements of this permit.

I.E.4. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. [R.61-79.270.30(c)]

I.E.5. Duty to Mitigate

In the event of non-compliance with this permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment. [R.61-79.270.30(d)]

I.E.6. Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of a backup auxiliary facility or similar systems only when necessary to achieve compliance with the conditions of this permit. [R.61-79.270.30(e)]

I.E.7. Duty to Provide Information

The Permittee shall furnish to the Department, within a reasonable time, any relevant information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit, or to determine compliance with this permit. The Permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit. [R.61-79.270.30(h), 264.74(a)]

I.E.8. Inspection and Entry

Pursuant to R.61-79.270.30(i), the Permittee shall allow the Department, or an authorized representative, upon the presentation of credentials and other documents, as may be required by law, to:

I.E.8.a. Enter, at reasonable times, upon the Permittee's premises where a regulated activity is located or conducted, or where records must be kept under the conditions of this permit;

I.E.8.b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

I.E.8.c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices or operations regulated as required under this permit; and

I.E.8.d. Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

I.E.9. Monitoring and Records

I.E.9.a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from Appendix I of R.61-79.261 or an equivalent method approved by the Department. Laboratory methods must be those specified in the most recent edition of Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846, Standard Methods of Wastewater Analysis. [R.61-79.270.30(j)(1)]

I.E.9.b. The Permittee shall retain at the facility records of all monitoring information, including all calibration and maintenance records of all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit, the certification required by R.61-79.264.73(b)(9), and records of all data used to complete the application for this permit for a period of at least three (3) years from the date of the sample, measurement, report, record, certification, or application. These periods may be extended by the Department at any time and are automatically extended during the course of any unresolved enforcement action regarding the facility. The Permittee shall maintain records from all groundwater monitoring wells and associated groundwater elevations for the active life of the facility, and for disposal units during the post-closure care period. [R.61-79.264.74(b) & 270.30(j)(2)]

I.E.9.c. Pursuant to R.61-79.270.30.(j)(3), records of monitoring information shall specify:

I.E.9.c.i. The dates, exact place, and times of sampling or measurements;

I.E.9.c.ii. The individuals who performed the sampling or measurements;

I.E.9.c.iii. The dates analyses were performed;

I.E.9.c.iv. The individuals who performed the analyses;

I.E.9.c.v. The analytical techniques or methods used; and

I.E.9.c.vi. The results of such analyses.

I.E.10. Reporting Planned Changes

The Permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. [R.61-79.270.30(l)(1)]

I.E.11. Reporting Anticipated Non-Compliance

The Permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in non-compliance with permit requirements. [R.61-79.270.30(l)(2)]

I.E.12. Transfer of Permits

This permit is not transferable to any person, except after notice to the Department. The Department may require modification or revocation and reissuance of the permit pursuant to R.61-79.270.40. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator, in writing, of the requirements of R.61-79.264 and 270 of this permit. [R.61-79.270.30(l)(3), 264.12(c)]

I.E.13. Compliance Schedules

Written notification of compliance or non-compliance with any item identified in the compliance schedule of this permit shall be submitted according to each schedule date. If the Permittee does not notify the Department within fourteen (14) calendar days of its compliance or non-compliance with the schedule, the Permittee shall be subject to an enforcement action. Submittal of a required item according to the schedule constitutes notification of compliance.

I.E.14. Imminent Hazard Reporting

The Permittee shall report to the Department any non-compliance with the permit which may endanger human health or the environment. Any such information shall be reported orally within twenty-four (24) hours from the time the Permittee becomes aware of the circumstances. This report shall include the following:

I.E.14.a. Information concerning the release of any hazardous waste or hazardous constituents which may endanger public drinking water supplies.

I.E.14.b Any information of a release or discharge of hazardous waste, or of a fire or

explosion from the hazardous waste management facility which could threaten the environment or human health outside the facility.

I.E.14.c. The description of the occurrence and its cause shall include:

i. Name, address, and telephone number of the owner or operator;

ii. Name, address, and telephone number of the facility;

iii. Date, time, and type of incident;

iv. Name and quantity of materials involved;

v. The extent of injuries, if any;

vi. An assessment of actual or potential hazard to the environment and human health outside the facility where this is applicable; and

vii. Estimated quantity and disposition of recovered material that resulted from the incident.

I.E.14.d. A written report shall also be provided to the Department within five (5) days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the non-compliance and its cause; the period(s) of non-compliance (including exact dates and times); whether the non-compliance has been corrected; and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the non-compliance. The Department may waive the five (5) day written notice requirement in favor of a written report within fifteen (15) days. [R.61-79.270.30(l)(6)]

I.E.15. Other Non-Compliance

The Permittee shall report all other instances of non-compliance not otherwise required to be reported in Permit Conditions I.E.10 through I.E.15. The reports shall contain the information listed in Permit Condition I.E.15. [R.61-79.270.30(l)(10)]

I.E.16. Other Information

Whenever the Permittee becomes aware that he (she) failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Department, the Permittee shall promptly submit such facts or information. [R.61-79.30(l)(11)]

I.F. SIGNATORY REQUIREMENT

All applications, reports, or information submitted to or requested by the Department or

authorized representative, shall be signed and certified in accordance with R.61-79.270.11 and 270.30(k).

I.G. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE DEPARTMENT

All reports, notifications, or other submissions which are required by this permit to be submitted to the Department, should be sent by certified mail to:

ATTN: Richard A. Haynes, P.E. Director
S.C. Department of Health & Environmental Control
Division of Waste Management
Bureau of Land & Waste Management
2600 Bull Street
Columbia, SC 29201
Phone: (803) 896-4000

A copy of all reports, notifications, or other information required by this Permit to be submitted to the Department should also be sent to the US EPA, Region IV by verifiable delivery at the following address:

U.S. Environmental Protection Agency
ATTN: RCRA Branch Chief
RCRA Programs and Materials Management Branch
Atlanta Federal Center
61 Forsythe Street
Atlanta, GA 30303
Phone: (404) 562-8527

I.H. CONFIDENTIAL INFORMATION

In accordance with R.61-79.270.12, the Permittee may claim confidential certain information required to be submitted by this permit.

I.I. DOCUMENTS TO BE MAINTAINED DURING POST-CLOSURE CARE PERIOD

Until post-closure care activities are completed, certified by an independent registered professional engineer, and approved by the Department, the Permittee shall maintain at the facility the following documents and amendments, revisions, and modifications to these documents:

I.I.1. All reports and documentation of compliance with R.61-79.264.118 and this permit during the post-closure care period.

I.I.2. Inspection schedules as required by R.61-79.264.15(b) and this permit.

I.I.3. Post-Closure Plans as required by R.61-79.118 and this permit.

I.I.4. Documentation of compliance with R.61-79.264.119, R.61-79.264.120 and this permit.

I.I.5. Cost estimates for facility post-closure as required by R.61-79.264.144 and this permit.

I.I.6. Corrective Action Plan(s) and reports as required by R.61-79.264.100 and 264.101 and this permit.

I.I.7. Cost estimates for completion of corrective action as required by R.61-79.264.90(a)(2) and 264.101 and this permit.

I.I.8. Groundwater monitoring reports as required by R.61-79.264.100 and this permit.

I.I.9. A survey plat and record of the type, location, and description of hazardous waste or hazardous constituents disposed of within the surface impoundment area as required by R.61-79.264.119.

MODULE II - GENERAL FACILITY CONDITIONS

II.A. DESIGN AND OPERATION OF FACILITY

The Permittee shall construct, maintain and operate the facility in a manner to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment, as required by R.61-79.264.31.

II.B. SECURITY

The Permittee shall comply with the security provisions specified in Section F-1 of the approved Permit application and of R.61-79.264.14(b) and (c).

II.C. GENERAL INSPECTION REQUIREMENTS

The Permittee shall follow the general inspection requirements set out in R.61-79.264.15. The Permittee shall remedy any deterioration or malfunction discovered by an inspection as required by R.61-79.264.15(c) and the permit application. Records of inspections shall be kept as required by R.61-79.264.15(d).

II.D. GENERAL POST-CLOSURE CARE REQUIREMENTS

II.D.1. Post-Closure Care Period

The Permittee shall perform post-closure care on the five (5) surface impoundments, associated drying beds and landfill in accordance with the requirements of R.61-79.264.117, this permit, and the Post-Closure Plan contained in the permit application.

II.D.2. Amendments to Post-Closure Plan

The Permittee shall amend the Post-Closure Plan in accordance with R.61-79.264.118(d), whenever necessary.

II.D.3. Certification of Completion of Post-Closure Care

The Permittee shall certify that the post-closure care period was performed in accordance with the specifications in the Post-Closure Plan as required by R.61-79.264.120.

II.E. COST ESTIMATE FOR FACILITY POST-CLOSURE

II.E.1. The Permittee's most recent post-closure cost estimate, prepared in accordance with R.61-79.264.144(a), is specified in Appendix J of the approved permit application.

II.E.2. The Permittee must adjust the post-closure cost estimate for inflation within thirty (30) days after the close of the firm's fiscal year and before submission of updated information

to the Department, as specified in R.61-79.264.144(b).

II.E.3. The Permittee must revise the post-closure cost estimate whenever there is a change in the facility's Post-Closure Plan, as required by R.61-79.264.144(c).

II.E.4. The Permittee must keep at the facility the latest post-closure cost estimate as required by R.61-79.264.144(d).

II.F. FINANCIAL ASSURANCE FOR FACILITY POST-CLOSURE

The Permittee shall demonstrate continuous compliance with R.61-79.264.145 by providing documentation of financial assurance as required by R.61-79.264.151 in at least the amount of the cost estimates required by Permit Condition II.E. Changes in financial assurance mechanisms must be approved by the Department pursuant to R.61-79.264.145.

II.G. INCAPABILITY OF OWNERS OR OPERATORS, GUARANTORS, OR FINANCIAL INSTITUTIONS

The Permittee shall comply with R.61-79.264.148.

II.H. POST-CLOSURE SECURITY

The Permittee shall maintain security at the facility during the post-closure care period, in accordance with the Post-Closure Plan and R.61-79.264.117(b).

II.I. LIABILITY REQUIREMENTS

II.I.1. The Permittee shall demonstrate continuous compliance with the requirements of R.61-79.264.147 and the documentation requirements of R.61-79.264.151 including the requirements to have and maintain liability coverage for sudden and accidental occurrences in the amount of at least one million dollars (1,000,000) per occurrence with an annual aggregate of at least two million dollars (2,000,000) exclusive of legal defense costs.

II.I.2. The Permittee shall demonstrate continuous compliance with the requirements of R.61-79.264.147(b) and the documentation requirements of R.61-79.264.151 including the requirements to have and maintain liability coverage for non-sudden accidental occurrences in the amount of at least three million dollars (3,000,000) per occurrence with an annual aggregate of at least six million dollars (6,000,000), exclusive of legal defense costs.

MODULE III - POST-CLOSURE CARE FOR SURFACE IMPOUNDMENTS, DRYING BEDS AND LANDFILL

III.A. MODULE HIGHLIGHTS

The conditions of this module apply to the general post-closure care requirements for the surface impoundments, drying beds and landfill as described below in Condition III.B. The conditions for Corrective Action, as required by R.61-79.264.100, are presented in Module IV of this permit.

III.B. UNIT IDENTIFICATION

The Permittee shall provide post-closure care for the hazardous waste management units (HWMU) identified below, subject to the terms and conditions of this permit.

Hazardous HWMU/(SWMU)	Date of Operation	Total Maximum Capacity	Description of Waste Contained	Waste No.
Surface Impoundment A (SWMU 13A)	1961-1983	50,000 (gal. total)	concentrated copper-cyanide wastewater	F009
Surface Impoundment B (SWMU 13B)	1961-1983	60,000 (gal. total)	concentrated copper-cyanide wastewater	F009
Surface Impoundment C (SWMU 13C)	1961-1983	19,000 (gal. total)	copper hydroxides & metal hydroxides	F009
Surface Impoundment D (SWMU 13D)	1961-1983	90,000 (gal. total)	chem. milling solution (oxalic acid with high fluoride concentrations	F006
Surface Impoundment E (SWMU 13E)	1961-1983	511,000 (gal. total)	chem. milling solution (oxalic acid with high fluoride concentrations)	F006
Sludge Drying Beds 1 & 2 (SWMU 11)	1961-1986	160 cubic yards	copper hydroxide sludge	F006
Copper Hydroxide Landfill #2 (SWMU 12)	1966-1983	500 cubic yards	metal hydroxide sludge	F006

III.C. POST-CLOSURE PROCEDURES AND USE OF PROPERTY

III.C.1. The Permittee shall conduct post-closure care in accordance with R.61-79.264.117 for the hazardous waste management unit described in Permit Conditions III.A. and B. above, for thirty (30) years after the completion of closure. The post-closure care period may be modified in accordance with R.61-79.264.117(a)(2).

III.C.2. The Permittee shall maintain and monitor the groundwater monitoring system and

comply with all other applicable requirements of R.61-79.264 Subpart F and Module IV of this permit during the post-closure period.

III.C.3. The Permittee shall comply with the requirements for landfills as follows: [R.61-79.264.310]

III.C.3.a. Maintain the integrity and effectiveness of the final cover; including making repairs to the liner system, as necessary, to correct the effects of settling, subsidence, erosion, or other events.

III.C.3.b. Protect and maintain surveyed benchmarks used in complying with the surveying and recordkeeping requirements of R.61-79.264.309.

III.D. INSPECTIONS

The Permittee shall inspect the components, structures, and equipment at the site in accordance with R.61-79.264.117(a)(1)(ii) and the inspection schedule in the Post-Closure Plan.

The Permittee shall inspect the cover system(s) for uniformity, drainage, and imperfections. Soil based covers must be inspected for imperfections including lenses, cracks, channels, root holes, or other structural non-uniformities that may cause an increase in the permeability of the cover.

III.E. NOTICES AND CERTIFICATION

III.E.1. If the Permittee or any subsequent owner or operator of the land upon which the hazardous waste disposal unit is located wishes to remove from the hazardous waste management unit hazardous wastes and hazardous waste residues, the liner, if any; or contaminated soils, then the Permittee shall request a modification to this post-closure permit in accordance with the applicable requirements in R.61-79.124 and 270. The Permittee or any subsequent owner or operator of the land shall demonstrate that the removal of hazardous wastes will satisfy the criteria of R.61-79.264.117.(c). [R.61-79.264.119(c)]

III.E.2. No later than sixty (60) days after the completion of the established post-closure care period for the hazardous waste management unit, the Permittee shall submit to the Department, by registered mail, a certification that the post-closure care for the hazardous waste management unit was performed in accordance with the specifications contained in the Post-Closure Plan and the Department's requirements as specified in this permit. The certification must be signed by the Permittee and an independent registered professional engineer. Documentation supporting the independent registered professional engineer’s certification must be furnished to the Department upon request until the Department releases the Permittee from the financial assurance requirements for post-closure care under R.61-79.264.145(i). [R.61-79.264.120]

III.F. **FINANCIAL ASSURANCE**

The Permittee shall maintain financial assurance during the post-closure care period and comply with all applicable requirements of R.61-79.264 Subpart H. [R.61-79.264.145]

III.G. **POST-CLOSURE PERMIT MODIFICATION**

The Permittee must submit a written request for a permit modification to authorize a change in the approved Post-Closure Plan included in the permit application in accordance with applicable requirements in R.61-79.124 and 270. The Permittee shall submit a written notification or request to the Department for a permit modification to amend the Post-Closure Plan at any time during the active life of the facility or during the Post-Closure Care period or whenever changes in operating plans or facility design affect the approved Post-Closure Plan. The Permittee must submit a written request for permit modification at least sixty (60) days prior to the proposed changes in facility design or operation, or no later than sixty (60) days after an unexpected event has occurred which has affected the Post-Closure Plan. [R.61-79.264.118(d)]

MODULE IV - GROUNDWATER REQUIREMENTS

IV.A. MODULE HIGHLIGHTS

The conditions of this module describe groundwater monitoring and corrective action programs for the five closed former surface impoundments, drying beds and landfill as described in Module III.B. This module presents permit conditions which address the regulatory requirements for a groundwater corrective action program in accordance with R.61-79.264.100.

The conditions of this module describe groundwater monitoring and corrective action programs. The groundwater monitoring portion of the permit describes the location, number, and depth of groundwater monitoring wells; identifies which wells are upgradient and downgradient; establishes a list of hazardous constituents and concentration limits which must be achieved through corrective action; defines the length of the compliance period; specifies the sampling and analysis protocols for the groundwater corrective action monitoring program, the statistical evaluations to be conducted, and the procedures for modifying the permit if any changes in the groundwater corrective action monitoring program are necessary. The corrective action portion of the permit consists of a description of the overall strategy for corrective action and routine evaluation of the effectiveness of the corrective action system.

IV.B. GROUNDWATER PROTECTION STANDARD

The Permittee shall ensure that the groundwater protection standard, as required under R.61-79.264.92, is being met or that remedial actions are being taken to reduce contaminant levels to meet standards. The Groundwater Protection Standard (GWPS) shall consist of the hazardous constituents and their corresponding concentration limits (Table 1, attached) as established under R.61-79.264.93 and R.61-79.264.94.

IV.C. POINT OF COMPLIANCE

The Point of Compliance (POC) is a vertical surface located at the hydraulically downgradient limit of the Waste Management Area (WMA) that extends down to the base of the uppermost aquifer underlying the regulated units. The WMA, as delineated in Figure 2 of the permit application and attached as Figure 1 of Module IV, includes five closed surface impoundments, two drying beds and a landfill which are RCRA hazardous waste management units. In map view, the POC is represented in Figure 1 of Module IV as a line running through those wells listed in Module IV, Table 2 of this Permit (Point of Compliance Monitoring Wells). Vertically, the POC extends downward to the bottom of hydrogeologic Zone 3(fractured bedrock), which is identified as the base of the uppermost aquifer in section E-5.1 of the permit application.

IV.D. COMPLIANCE PERIOD

The Permittee shall comply with the provisions specified in R.61-79.264.96 for the

duration of the compliance period. The compliance period is equal to twenty two (22) years for the surface impoundments, twenty five (25) years for the drying beds and seventeen (17) years for the landfill. The compliance period for all units began on June 30, 1988, when the first Hazardous Waste Post-Closure Permit was issued, and will end on June 30, 2010 for the surface impoundments. The compliance period for the drying beds ends on June 30, 2013 and June 30, 2005 for the landfill. If the Permittee is engaged in corrective action at the end of the compliance period as specified above, the compliance period will be extended until the Permittee can demonstrate that the groundwater protection standard of R.61-79.264.92 has not been exceeded for a period of three (3) consecutive years at the point of compliance.

IV.E. GROUNDWATER CORRECTIVE ACTION MONITORING SYSTEM

The groundwater monitoring system must be capable of demonstrating the effectiveness of the corrective action program and determining compliance with the GWPS. Groundwater monitoring and correct action shall be conducted in accordance with the requirements of R.61-79.264 Subpart F and as specified by the Conditions of this Permit. The Permittee shall design, install and/or maintain a groundwater monitoring system to comply with applicable portions of R.61-79.264 Subpart F and as specified below.

IV.E.1. The Permittee shall maintain those groundwater monitoring wells listed in Module IV, Table 3 (Groundwater Monitoring Schedule) of this Permit to meet background requirements, or to monitor the contaminant plume pursuant to Permit Condition IV.E.4.

IV.E.2. Monitoring wells listed in Module IV, Table 2 of this Permit will be used to monitor background groundwater quality.

IV.E.3. Monitoring wells listed in Module IV, Table 2 of this Permit will be used to monitor groundwater quality at the POC. These monitoring wells will constitute the POC monitoring well system.

IV.E.4. Monitoring wells listed in Module IV, Table 3 (Groundwater Monitoring Schedule) shall be used to monitor the contaminant plume movement and to assess the effectiveness of the corrective action program.

IV.E.5. The Permittee shall install additional wells as necessary to maintain compliance with R.61-79.264 Subpart F requirements. A proposal for the design, location and installation of any additional well(s) shall be submitted to the Department for approval at least 45 days prior to planned installation. Written approval must be obtained prior to initiating the drilling or installation of any monitoring well.

IV.E.6. The Permittee shall ensure that all wells are designed, installed, and maintained such that the groundwater samples are representative of the true water quality. Additionally, the wells shall be designed, installed and monitored in such a manner so as to prevent interconnection between different hydrologic units. Failure of any well(s) to meet the standards described herein shall not interfere

with the groundwater monitoring or corrective action programs.

IV.E.7. The Permittee shall properly abandon any well(s) not meeting the standard of Permit Condition IV.E.6. A proposal for specific well abandonment procedures shall be submitted to the Department for approval at least thirty (30) days prior to beginning abandonment procedures.

IV.F **CORRECTIVE ACTION PROGRAM**

The Permittee shall implement and maintain a corrective action program as required under R.61-79.264.100.

IV.F.1. The Permittee shall establish, implement and maintain a corrective action program that prevents hazardous constituents from exceeding their respective concentration limits (specified in Module IV, Table 1) at the point of compliance by removing the hazardous waste constituents or by treating them in place. The Permittee shall conduct a corrective action program which remediates contaminated groundwater at the POC and which has migrated beyond the POC in accordance with R.61-79.264.100 and 101.

IV.F.2. The Permittee must continue corrective action measures during the compliance period to the extent necessary to ensure that the groundwater protection standard is not exceeded. If corrective action is required beyond the compliance period, corrective action must continue until the groundwater protection standard has not been exceeded for three (3) consecutive years in accordance with R.61-79.264.100(f).

IV.F.3. If the Permittee determines that the corrective action program no longer satisfies the requirements of R.61-79.264.100, within ninety (90) days of such a determination, the Permittee must submit a permit modification request pursuant to R.61-79.270.41 to make any appropriate changes to the corrective action system.

IV.G **SAMPLING AND ANALYSIS PROCEDURES**

The Permittee shall use the following techniques and procedures when obtaining and analyzing groundwater samples from the groundwater monitoring wells described in Permit Condition IV.E. to provide a reliable indication of groundwater quality as required under R.61-79.264.97(d) and (e).

IV.G.1. Groundwater samples shall be collected, preserved, shipped and analyzed in accordance with the procedures specified in the Groundwater Sampling and Analysis Plan, Appendix E of the permit application.

IV.G.2. The Permittee shall ensure that the frequency of sample collection and the wells to be sampled are in accordance with the Groundwater Monitoring Schedule, Table 3, of this Permit.

IV.G.3. Samples shall be tracked and controlled using a chain-of-custody procedures specified in the Groundwater Sampling and Analysis Procedures Plan, Appendix E, in the permit application.

IV.G.4. Samples shall be analyzed according to the Groundwater Sampling and Analysis Procedures Plan, Appendix E of the permit application, or the most current final version of EPA Test Methods for Evaluating Solid Waste SW-846 using whichever procedure is more recent at the time of analysis. Analytical methods must be selected from EPA Test Methods for Evaluating Solid Waste SW-846. For those constituents which have an established Maximum Contaminant Levels (MCLs) the analytical method chosen must be capable of achieving a Practical Quantitation Limit (PQL) below the established MCL for that constituent. For those constituents which do not have an established MCL, the analytical method must achieve the lowest reasonably achievable PQL based on instrumentation and the analytical method.

IV.G.5. Whenever the Permittee changes the analytical contractor/laboratory, the Permittee shall submit to the Department within 30 days of such changes a copy of the new Sampling Program or Laboratory Quality Assurance/Quality Control (QA/QC) Program. The Department will evaluate the new program and determine if it differs significantly from the program in the approved application. If the program differs significantly the Department will notify the Permittee and require the Permittee to submit an application for permit modification pursuant to R.61-79.270.41.

IV.H. **BACKGROUND GROUNDWATER QUALITY**

The Permittee shall establish background groundwater quality in accordance with R.61-79.264.97 by collecting and analyzing groundwater samples from those background groundwater monitoring wells listed in Module IV, Table 2 in accordance with the Groundwater Monitoring Schedule, (Module IV, Table 3), of this permit. Samples shall be collected and reported to the Department in accordance with Permit Conditions IV.K and IV.L.

IV.I. **GROUNDWATER ELEVATION**

IV.I.1. The Permittee shall measure and record the groundwater elevation in all monitoring wells listed in Table 3 quarterly. The Permittee will report the water level data with the groundwater quality analytical results as specified in Permit Condition IV.L. Within thirty (30) days after each measurement, the Permittee shall use the water level data to evaluate the direction and rate of groundwater flow and determine whether the requirements for locating monitoring wells continue to be satisfied. If the Permittee determines that the conditions are no longer satisfied, the Permittee must submit a proposal to the Department within sixty (60) days to modify the monitoring system. If the modification is significant, the Permittee shall be required to submit an application for permit

modification.

IV.I.2. The Permittee shall report the surveyed elevation of monitoring well(s) to the nearest 0.01 foot within forty-five (45) days of installation along with as-built drawings and lithologic logs. The Permittee shall also report the total well depth, elevation of the top of casing, ground surface and protective casing.

IV.J. STATISTICS

The Permittee shall utilize a statistical procedures meeting the requirements of R.61-79.264.99 to determine compliance with the Groundwater Protection Standard.

IV.K. CORRECTIVE ACTION MONITORING PROGRAM AND DATA EVALUATION

The Permittee shall continue to design, implement, and maintain a groundwater monitoring program capable of demonstrating the effectiveness of the corrective action program and determining compliance with the GWPS. Groundwater monitoring and corrective action shall be conducted in accordance with the requirements of R.61-79.264.97, R.61-79.264.100 and as specified by the conditions of this permit.

IV.K.1. The Permittee shall design, implement, and maintain a corrective action program that prevents hazardous constituents from exceeding the GWPS as specified in Permit Condition IV.F.

IV.K.2 The Permittee must conduct a corrective action program to remove and treat any hazardous constituents that exceed the GWPS as specified in Permit Condition IV.D in groundwater between the compliance point and the downgradient property boundary, and beyond the property boundary where necessary to protect human health and the environment in accordance with R.61-79.264.100(e).

IV.K.3 The Permittee shall ensure that the groundwater corrective action system (i.e. groundwater recovery components and ancillary treatment equipment) is maintained to operate as specified in Section E.7-1.

IV.K.4 The Permittee began groundwater corrective action at the closed SWMUs in 1989. The purpose of the groundwater treatment system is to create a hydraulic barrier system (recovery wells R-1 through R-11) and enhancement recovery wells (R-12R, R-13 and R-15). Enhancement Recovery Well R-14 was removed from service and is used as a groundwater monitoring well. The groundwater recovery system removes groundwater from the soil, partially weathered rock and upper fractured bedrock. The recovered groundwater is pumped to two on-site air-stripping towers, treated and then discharged under a NPDES permit. An Interim Stabilization Measures installed at SWMA G consists of Recovery Well R-16. An Interim Stabilization Measures system was installed consisting of an air sparge/soil vapor extraction system at the SWMU 15 source area and Recovery wells R-17 and R-18.

IV.K.5 The Permittee shall continue corrective action during the compliance period to the extent necessary to ensure that the GWPS is not exceeded. In accordance with R.61-79.264.100(f), the compliance period is automatically extended, if necessary, until the GWPS has not been exceeded for three (3) consecutive years.

IV.K.6 If the Permittee determines that the corrective action program no longer satisfies the requirements of R.61-79.100, within ninety (90) days of such a determination, the Permittee must submit a permit modification request pursuant to R.61-79.270.42 to make any appropriate changes to the corrective action system.

IV.K.7 The Permittee shall collect, preserve, and analyze all groundwater samples as required by Permit Condition IV.G.

IV.K.8 The Permittee shall monitor groundwater quality for the list of parameters specified in Module IV, Table 1 of this permit following the sampling and analysis plan required by Permit Condition IV.G.

IV.K.9 Annually, the Permittee shall collect groundwater samples from POC monitoring wells W-16 and W-20, as specified in section E-6.2.2 of the permit application, to be analyzed for constituents from R.61-79.264 Appendix IX of the South Carolina Hazardous Waste Management Regulations (SCHWMRs). If constituents from Appendix IX are detected that are not identified in the groundwater protection standard of this Permit, the Permittee may resample within one month and repeat the Appendix IX analysis to confirm the detection in accordance with R.61-79.264.99(g). If detection is confirmed by resampling or the facility chooses not to resample, the Permittee shall notify the Department within seven (7) days and immediately begin sampling and analysis for the new constituents in the groundwater monitoring program.

IV.K.10 Each quarter the Permittee shall utilize data collected during the quarter to evaluate the effectiveness of the corrective action program. This evaluation shall include, at a minimum, a review of available data concerning water quality, water level elevations and other significant hydrogeologic information and be reported according to permit condition IV.L.

IV.K.11 The Permittee shall treat, store and/or dispose of all contaminated groundwater in accordance with all applicable federal, state and local laws.

IV.L. **RECORD KEEPING AND REPORTING**

IV.L.1. The Permittee shall enter all monitoring, testing, analytical, and corrective action data obtained pursuant to permit conditions IV.A through IV.L into the operating record as required by R.61-79.264.73(b)(6).

IV.L.2. Annually, the Permittee shall submit to the Department a detailed report on the

effectiveness of the corrective action program. The report shall be submitted within sixty (60) days of the end of the semi-annual period. The annual report shall include, at a minimum, the following:

i. Groundwater elevation data and groundwater quality data in table form for all constituents sampled during each sampling event. The sample chain of custody, field records and laboratory data sheets to include the date of extraction and date of analysis for each sample shall be submitted;

ii. Potentiometric maps depicting groundwater flow and directions for each hydrogeologic unit based on gradients for each quarter shall be submitted. An evaluation of any significant changes in gradients or flow direction shall be included;

iii. Isoconcentration maps for pertinent parameters to include, but not necessarily be limited to; trichloroethene, 1,2-dichloroethene, trichlorofluoromethane, total volatile organics, total semi-volatile organics, total inorganics and total herbicides for concentration levels detected in groundwater samples from monitoring wells listed in Permit Conditions IV.E.3, IV.E.4, IV.E.5 and any additional wells which monitor plume movement and extent. Large scale maps should be used;

iv. Volume of groundwater treated by any corrective action systems operating (monthly and cumulative);

v. Inches of rainfall, measured on site, during the reporting period;

vi. Summary of any system down time with explanations;

vii. Description of any minor modifications or repairs to the groundwater monitoring and corrective action system.

viii. Detailed narrative evaluating and discussing the effectiveness of the corrective action system.

IV.L.3. On or before March 1 of each year, the Permittee shall submit a detailed annual report describing the effectiveness of the corrective action program during the preceding year. This report shall include, at a minimum, all of the elements required as described in Permit Condition IV.L.2 and the following:

i. Hydrographs for the POC wells and those groundwater monitoring wells positioned adjacent to recovery wells as that are a subset of those wells listed on Table 3 depicting groundwater elevations through time. A table to reference actual calendar dates corresponding to sampling events shall also be submitted to aid in interpreting the hydrographs for each well. Nested wells may be included on the same hydrograph;

ii. Time vs. concentration plots for trichloroethene, 1,2-dichloroethene, trichlorofluoromethane, total volatile organics, total semi-volatile organics, total inorganics and total herbicides and any other parameters pertinent for monitoring the effectiveness of the corrective action system for POC monitoring wells listed in Table 2 and a representative number of downgradient wells used to monitor plume movement;

iii. Statistical evaluation of water quality data for significant changes. This evaluation should be conducted on the POC wells listed in Table 2 and a representative number of downgradient wells monitoring plume movement and extent;

iv. Hydrogeologic cross sections depicting all hydrogeologic units to include concentration levels detected from groundwater samples collected during the previous sampling event. At least one cross section should be oriented perpendicular through the POC wells and include the background groundwater monitoring well.

v. Determination of the extent and severity of groundwater contamination. This may be delineated on the large scale isoconcentration maps and cross sections;

vi. Table depicting all constituents from R.61-79.264 Appendix IX of the SCHWMR detected in groundwater samples since the initiation of interim status. This table should include, at minimum, well identification, date of sample collection, parameter detected, concentration levels, date of resample and analytical results;

vii. Detailed narrative evaluating and discussing the effectiveness of the corrective action system. This should include a discussion of all statistical and time trend analyses to date for the past year plus the zone of capture, groundwater flow rate and groundwater flow direction.

IV.M. **DUTY OF PERMITTEE**

The Permittee shall assure that the groundwater monitoring and corrective action programs are in compliance with the requirements of R.61-79.264 Subpart F throughout the post-closure period.

IV.N. **PERMIT MODIFICATION**

IV.N.1. If the Permittee at any time determines that the corrective action program required by this Permit no longer satisfies the requirements of R.61-79.264.100 and R.61-79.264.101 for releases of hazardous constituents listed in Table 1 (GWPS) that originate from the regulated unit, the Permittee must within ninety (90) days submit an application for a permit modification to make any appropriate changes in the program, as required under R.61-79.264.100(h).

IV.N.2. If the Permittee meets or exceeds the requirements of R.61-79.264.100 and R.61-79.264.101 and meets the GWPS, the Permittee may submit an application for a permit modification pursuant to R.61-79.270.41 to terminate the corrective action program and establish a compliance groundwater monitoring program.

TABLE 1
GROUNDWATER PROTECTION STANDARD
TIMKEN US LLC
SCD 003 345 683

PARAMETER	CONCENTRATION LIMIT	
Inorganics (mg/L)		
Barium	2.0	*
Cadmium	0.005	*
Chromium	0.1	*
Cobalt	0.0047	**
Copper	1.3	*
Cyanide	0.2	*
Fluoride	4.0	*
Lead	0.015	*
Mercury	0.002	*
Nickel	0.3	**
Vanadium	0.078	**
Zinc	4.7	**
Volatile Organic Compounds (µg/L)		
Acetone	12000	**
Benzene	5.0	*
Dichloromethane (methylene chloride)	5.0	*
Dichlorobromomethane	80.0	*
1,1-Dichloroethane	2.4	**
1,1-Dichloroethene	7.0	*
1,2-Dichloroethene,cis	70.0	*
1,2-Dichloroethene,trans	100.0	*
Trichloromethane (chloroform)	0.19	**
1,1,1-Trichloroethane	200.0	*
1,1,2-Trichloroethane	5.0	*
Trichloroethene	5.0	*
Tetrachloroethene	5.0	*
Trichlorofluoromethane	1100	**
Toluene	1000	*
Vinyl Chloride	2.0	*
Xylene	10000	*
Semi-Volatile Organic Compounds (µg/L)		
Phenol	4500	**
2,4,5-Tricholorphenol	890	**
2,4,6-Trichlororphenol	3.5	**
p-chloro-m-cresol	1100	**
p-Nitrophenol	10.0	***
Herbicides & Pesticides (µg/L)		
2,4,5-Trichlorophenoxyacetic acid	120.0	**
2,4,5-TP (Silvex)	50.0	*

* MCL - Maximum Contaminant Level, U.S. EPA Drinking Water Regulations and Health Advisories (07/2010 or most recent version)
** RSL – Regional Screening Levels for Chemical Contaminants at Superfund Sites (April 2012 or most recent)
*** PQL – Practical Quantitation Limit as defined in R.61-79.264, Appendix IX

TABLE 2
Monitoring and Recovery Well Systems
For the Seven Closed HWMUs, SWMAs A, B, C, D, E, F, and G
TIMKEN US LLC
SCD 003 345 683

Well Type	**Well Identification**	**Description**
Point of Compliance	W-11, W-14, W-15, W-16, W-17, W-23 W-20, W-29	Water Table Zone Fractured Bedrock Zone
Background Monitoring Wells	W-1A	Water Table Zone
Groundwater Recovery Wells	R-1 Through R-11 R-12R, R-13, R-15, R-16 R-17, R-18, R-19	Located West Side of Facility Located Downgradient of Source Areas Located Downgradient of SWMUs 15 and 51 near Torrington Road
Soil Vapor Extraction Wells	SV-1, SV-2,SV-3, SV-4	Extraction of Soil Gas from the Vadose Zone
Injection Well	AS-1	Air Sparge well located at the 3 former USTs (SWMU 15)
Pressure Point Wells	PP-1 through PP-7	Located in the Vadose Zone for subsurface gas pressure monitoring
Plume Assessment Wells	W-5, W-8, W-9, W-11, W-12, W-14, W-15, W-16, W-17, W-18, W-19, W-20, W-22, W-23, W-25, W-26, W-27, W-28, W-29, W-30, W-33, W-38, W-39, W-40, W-42, W-43, W-44, W-45, W-46, W-47, W-49, W-51, W-56, R-14 T-1, T-2, T-4, T-17, T-18, W-34, W-35, W-36, W-54, W-55, W-76 T-5, T-6, T-7, T-8, T-11, T-12, T-23, W-52, W-53, W-58, W-59, W-60, W-61, W-62, W-77, W-78, W-79, W-80, W-81, W-82,	HWMUs Groundwater Monitoring Wells SWMA G Groundwater Monitoring Wells SWMA H Groundwater Monitoring Wells

Well Type	Well Identification	Description
	W-83R, W-84, W-85, W-86, W-87, W-88, W-89, W-90, W-91, W-92, W-93	
	CH-4, CH-7, CH9, CH-11, CH-14	SWMA I Groundwater Monitoring Wells
	W-64, W-65, W-66	AOC No. 1 Groundwater Monitoring Wells
Groundwater Elevation Wells	TW-1	Located near the hydraulic barrier system
	P-1 through P-21	Piezometers for Facility Elevation measurements
	O-1 through O-18	Observation Wells for the hydraulic barrier system
Cyanide Detection Well	CN-1	Monitoring Well for the cyanide release

TABLE 3
GROUNDWATER MONITORING SCHEDULE
TIMKEN US LLC
SCD 003 345 683

MW No.	Location	Purpose	VOCs	SVOCs	Cyanide	Fluoride	Metals	Herbicides
W-1A	ON	BKGD				FL-1	Metals-1	
W-5	ON	CAE	VOCS-1				Metals-1	
W-8	ON	CAE	VOCS-1	SVOCS-1				
W-9	ON	CAE	VOCS +Tcfm-2			FL-1		245-T & Silvex-1
W-11	ON	POC	VOCS-1	SVOCS-1	CN-1	FL-1	Metals-1	
W-12	ON	CAE					Metals-2	245-T & Silvex-1
W-14	ON	POC	VOCS-1	SVOCS-1	CN-1	FL-1	Metals-2	245-T & Silvex-1
W-15	ON	POC	VOCS-2	SVOCS-2	CN-1	FL-1	Metals-2	
W-16 (2^{nd})	ON	POC	VOCS-1	SVOCS-1	CN-1	FL-1	Metals-1	
W-16 (4^{th})	ON	POC	South Carolina Appendix IX Constituent List					
W-17	ON	POC	VOCS-1	SVOCS-1	CN-1	FL-1	Metals-1	
W-18	ON	CAE	VOCS-1				Metals-1	
W-19	ON	CAE						
W-20 (2^{ND})	ON	POC	VOCS-1	SVOCS-1	CN-1	FL-1	Metals-1	
W-20 (4^{th})	ON	POC	South Carolina Appendix IX Constituent List					
W-22	ON	CAE	VOCS +Tcfm-2		CN-2	FL-2	Metals-2	245-T & Silvex-1
W-23	ON	POC	VOCS +Tcfm	SVOCS-2	CN-2	FL-2	Metals-2	
W-25	ON	CAE	VOCS +Tcfm-2				Metals-2	
W-26	ON	CAE	VOCS +Tcfm-2					
W-27	ON	CAE SWMA G	VOCS +Tcfm-2					245-T & Silvex-1
W-28	ON	CAE SWMA G	VOCS +Tcfm-2					245-T & Silvex-1
W-29	ON	POC	VOCS-1	SVOCS-1	CN-1	FL-1	Metals-1	
W-30	ON	CAE						
W-33	ON	CAE	VOCS-1					
W-34	ON	CAE SWMA G	VOCS+ Tcfm-2		CN-1	FL-1		
W-35	ON	CAE SWMA G	VOCS + Tcfm-2				Metals-1	
W-36	ON	SWMA G	VOCS+ Tcfm-2					
W-38	ON	CAE	VOCS-2			FL-1		
W-39	ON	CAE	VOCS-2			FL-1		
W-40	ON	CAE	VOCS-1					
W-42	ON	CAE						

W-43	ON	CAE	VOCS + Tcfm-2			FL-1		
W-44	ON	CAE						
W-45	ON	CAE	VOCS + Tcfm-2			FL-1	Metals-2	
W-46	OFF	CAE						
W-47	OFF	CAE	VOCS-1			FL-1	Metals-1	
W-49	OFF	CAE	VOCS-1					
W-51	OFF	CAE	VOCS-1					
W-52	ON	SWMA H	VOCS-2					
W-53	ON	SWMA H	VOCS-2					
W-54	ON	SWMA G	VOCS + Tfcm-2					
W-55	ON	SWMA G	VOCS + Tcfm-2					
W-56	ON	CAE	VOCS-1					
W-58	ON	SWMA H						
W-59	ON	SWMA H	VOCS-2					
W-60	ON	SWMA H	VOCS-2					
W-61	ON	SWMA H	VOCS-2					
W-62	ON	SWMA H	VOCS-1					
W-64	ON	AOC 1	VOCS + Tcfm-2		CN-1	FL-1	Metals-1	
W-65	ON	AOC 1	VOCS + Tcfm-2		CN-1	FL-1	Metals-1	
W-66	ON	AOC 1	VOCS + Tcfm-2		CN-1	FL-1	Metals-1	
W-76	ON	SWMA G	VOCS + Tcfm-2					
W-77	ON	SWMA H						
W-78	ON	SWMA H	VOCS-2					
W-79	ON	SWMA H	VOCS-1					
W-80	ON	SWMA H	VOCS-2					
W-81	ON	SWMA H	VOCS-2					
W-82	ON	SWMA H						
W-83R	ON	SWMA H	VOCS-1					
W-84	OFF	SWMA H	VOCS-1					
W-85	OFF	SWMA H	VOCS-1					
W-86	OFF	SWMA H	VOCS-1					
W-87	OFF	SWMA H	VOCS-1					
W-88	OFF	SWMA H	VOCS-2					
W-89	OFF	SWMA H	VOCS-2					
W-90	OFF	SWMA H	VOCS-2					
W-91	OFF	SWMA H	VOCS-2					
W-92	OFF	SWMA H	VOCS-1					
W-93	ON	SWMA H	VOCS-2					
T-1	ON	SWMA G						
T-2	ON	SWMA G	VOCS+ Tcfm-1					
T-4	ON	SWMA G	VOCS+ Tcfm-2				Metals-1	245-T & Silvex-1
T-5	ON	SWMA H	VOCS-2					
T-6	ON	SWMA H						
T-7	ON	SWMA H						

T-8	ON	SWMA H						
T-11	ON	SWMA H	VOCS-1					
T-12	ON	SWMA H						
T-17	ON	SWMA G	VOCS+ Tcfm-2				Metals-1	
T-18	ON	SWMA G	VOCS+ Tcfm-2				Metals-1	
T-23	ON	SWMA H						
CH-4	ON	SWMA I						
CH-7	ON	SWMA I	VOCS-1				Metals-1	
CH-9	ON	SWMA I					Metals-1	
CH-11	ON	SWMA I	VOCS-1		CN-1	FL-1	Metals-1	
CH-14	ON	SWMA I			CN-2		Metals-2	

KEY:

VOCS - Volatile Organic Compounds analyzed using EPA Method 8260B
Tcfm – Trichlorofluoromethane analyzed using EPA Method 8260B
SVOCS – Semi-Volatile Organic Compounds analyzed using EPA Method 8270C
CN – Cyanide analyzed using EPA Method 9012/9014
FL – Fluoride analyzed using EPA Method 9056
Metals - Barium, Cadmium, Cobalt, Chromium, Lead, Mercury, Nickel, Vanadium and Zinc analyzed using EPA Methods 6010B or 7470A
"-1" denotes sampled and analyzed annually
"-2" denotes sampled and analyzed semi-annually
POC – Point of Compliance
CAE – Corrective Action Effectiveness monitoring well
SWMA H – Solid Waste Management Area H monitoring well
AOC 1 – Area of Concern No. 1
Appendix IX Constituents will consist of: VOCs. SAVOCs, cyanide, fluoride, sulfide, 17 metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, tin, vanadium, and zinc), herbicides, pesticides, PCBs, and dioxins/furans

MODULE V - CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

V.A. **APPLICABILITY**

The Conditions of this Part apply to:

V.A.1. The solid waste management units (SWMUs) and areas of concern (AOCs) identified in Appendix A-2, which require a RCRA Facility Investigation (RFI); and Appendix A-1 which is a summary all SWMUs and AOCs identified since the 1988 permit.

V.A.2. Any additional SWMUs or AOCs discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means.

V.A.3. The Permittee shall implement corrective actions beyond the facility boundary where necessary to protect human health and the environment, unless the Permittee demonstrates to the satisfaction of the Department that, despite the Permittee's best efforts, as determined by the Department, the Permittee was unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied. On-site measures to address such releases will be determined on a case-by-case basis. Assurances of financial responsibility for completion of such off-site corrective action will be required.

V.B. **NOTIFICATION AND ASSESSMENT REQUIREMENTS FOR NEWLY IDENTIFIED SWMUs AND AOCs**

V.B.1. The Permittee shall notify the Department in writing, within fifteen (15) calendar days of discovery, of any additional AOCs as discovered under Condition V.A.2. The notification shall include, at a minimum, the location of the AOC and all available information pertaining to the nature of the release (e.g., media affected, hazardous constituents released, magnitude of release, etc.). If the Department determines that further investigation of an AOC is required, the permit will be modified in accordance with R.61-79.270.41.

V.B.2. The Permittee shall notify the Department in writing, within fifteen (15) calendar days of discovery, of any additional SWMU as discovered under Condition V.A.2.

V.B.3. The Permittee shall prepare and submit to the Department, within ninety (90) calendar days of notification, a SWMU Assessment Report (SAR) for each SWMU identified under Condition V.B.2. At a minimum, the SAR shall provide the following information:

a. Location of unit(s) on a topographic map of appropriate scale such as required under R.61-79.270.14(b)(19).

b. Designation of type and function of unit(s).

c. General dimensions, capacities and structural description of unit(s) (supply any available plans/drawings).

d. Dates that the unit(s) was operated.

e. Specification of all wastes that have been managed at/in the unit(s) to the extent available. Include any available data on hazardous constituents in the wastes.

f. All available information pertaining to any release of hazardous waste or hazardous constituents from such unit(s) (to include groundwater data, soil analyses, air, and/or surface water data).

V.B.4. Based on the results of the SAR, the Department shall determine the need for further investigations at the SWMUs covered in the SAR. If the Department determines that such investigations are needed, the Permittee shall be required to prepare a plan for such investigations as outlined in Permit Condition V.E.1.b or V.D.

V.C. NOTIFICATION REQUIREMENTS FOR NEWLY DISCOVERED RELEASES AT PREVIOUSLY IDENTIFIED SWMUs or AOCs

V.C.1. The Permittee shall notify the Department in writing of any newly discovered release(s) of hazardous waste or hazardous constituents discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means, within fifteen (15) calendar days of discovery. Such newly discovered releases may be from SWMUs or AOCs identified in Permit Condition V.A.2 for which further investigation under Permit Condition V.B.4 was not required.

V.C.2. If the Department determines that further investigation of the SWMUs or AOCs is needed, the Permittee shall be required to prepare a plan for such investigations as outlined in Condition V.E.1.b.

V.D. CONFIRMATORY SAMPLING (CS)

V.D.1. The Permittee shall prepare and submit to the Department, within forty five (45) calendar days of the notification by the Department for a newly identified SWMU or AOC, a Confirmatory Sampling (CS) Work Plan to determine any release from SWMUs or AOCs identified in Condition V.A.2 and Condition V.B.4. The CS Work Plan shall include schedules of implementation and completion of specific actions necessary to determine whether or not a release has occurred. It should also address applicable requirements and affected media.

V.D.2. The CS Work Plan must be approved by the Department, in writing, prior to implementation. The Department shall specify the start date of the CS Work Plan

schedule in the letter approving the CS Work Plan. If the Department disapproves the CS Work Plan, the Department shall either (1) notify the Permittee in writing of the CS Work Plan's deficiencies and specify a due date for submission of a revised CS Work Plan, (2) revise the CS Work Plan and notify the Permittee of the revisions, or (3) conditionally approve the CS Work Plan and notify the Permittee of the conditions.

V.D.3. The Permittee shall implement the confirmatory sampling in accordance with the approved CS Work Plan.

V.D.4. The Permittee shall prepare and submit to the Department in accordance with the schedule in the approved CS Work Plan, a Confirmatory Sampling (CS) identifying those SWMUs or AOCs listed in Condition V.A.2 and Condition V.B.4 that have released hazardous waste or hazardous constituents into the environment. The CS Report shall include all data, including raw data, and a summary and analysis of the data that supports the above determination.

V.D.5. Based on the results of the CS Report, the Department shall determine the need for further investigations at the SWMUs or AOCs covered in the CS Report. If the Department determines that such investigations are needed, the Permittee shall be required to prepare a plan for such investigations as outlined in Condition V.E.1.b. The Department will notify the permittee of any no further action decision.

V.E. **RCRA FACILITY INVESTIGATION (RFI)**

V.E.1.a The Permittee shall prepare and submit to the Department, within ninety (90) calendar days of notification by the Department, an RFI Work Plan for those units identified under Condition V.B.4, Condition V.C.2, or Condition V.D.5. The RFI Work Plan(s) shall be developed to meet the requirements of Condition V.E.1.b.

V.E.1.b The RFI Work Plan(s) shall meet the requirements of Appendix B. The RFI Work Plan(s) shall include schedules of implementation and completion of specific actions necessary to determine the nature and extent of contamination and the potential pathways of contaminant releases to the air, land, surface water, and groundwater. The Permittee must provide sufficient justification and associated documentation that a release is not probable or has already been characterized if a unit or a media/pathway associated with a unit (groundwater, surface water, soil, subsurface gas, or air) is not included in the RFI Work Plan(s). Such deletions of a unit, media or pathway from the RFI(s) are subject to the approval of the Department. The Permittee shall provide sufficient written justification for any omissions or deviations from the minimum requirements of Appendix B. Such omissions or deviations are subject to the approval of the Department. In addition, the scope of the RFI Work Plan(s) shall include all investigations necessary to ensure compliance with R.61-79.264.101(c).

V.E.1.c The RFI Work Plan(s) must be approved by the Department, in writing, prior to implementation. The Department shall specify the start date of the RFI Work Plan schedule in the letter approving the RFI Work Plan(s). If the Department disapproves the RFI Work Plan(s), the Department shall either (1) notify the

Permittee in writing of the RFI Work Plan's deficiencies and specify a due date for submission of a revised RFI Work Plan, (2) revise the RFI Work Plan and notify the Permittee of the revisions and the start date of the schedule within the approved RFI Work Plan, or (3) conditionally approve the RFI Work Plan and notify the Permittee of the conditions.

V.E.2. RFI Implementation

The Permittee shall implement the RFI(s) in accordance with the approved RFI Work Plan(s) and Appendix B. The Permittee shall notify the Department within twenty (20) days prior to any sampling activity.

V.E.3. RFI Reports

V.E.3.a. If the time required to conduct the RFI(s) is greater than one hundred eighty (180) calendar days, the Permittee shall provide the Department with quarterly RFI Progress Reports (90 day intervals) beginning ninety (90) calendar days from the start date specified by the Department in the RFI Work Plan approval letter. The Progress Reports shall contain the following information at a minimum:

i. A description of the portion of the RFI completed;

ii. Summaries of findings;

iii. Summaries of any deviations from the approved RFI Work Plan during the reporting period;

iv. Summaries of all contacts with local community public interest groups or State government;

v. Summaries of any problems or potential problems encountered during the reporting period;

vi. Actions taken to rectify problems;

vii. Changes in relevant personnel;

viii. Projected work for the next reporting period; and

ix. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

V.E.3.b. The Permittee shall prepare and submit to the Department Draft and Final RCRA Facility Investigation Report(s) for the investigations conducted pursuant to the RFI Work Plan(s) submitted under Condition V.E.1. The Draft RFI Report(s) shall be submitted to the Department for review in accordance with the schedule in the approved RFI Work Plan(s). The Final RFI Report(s) shall be submitted to the Department within thirty (30) calendar days of receipt of the Department's comments on the Draft RFI Report. The RFI Report(s) shall include an analysis

and summary of all required investigations of SWMUs and AOCs and their results. The summary shall describe the type and extent of contamination at the facility, including sources and migration pathways, identify all hazardous constituents present in all media, and describe actual or potential receptors. The RFI Report(s) shall also describe the extent of contamination (qualitative/quantitative) in relation to background levels indicative of the area. If the Draft RFI Report is a summary of the initial phase investigatory work, the report shall include a work plan for the final phase investigatory actions required based on the initial findings. Approval of the final phase work plan shall be carried out in accordance with Condition V.E.1.c. The objective of this task shall be to ensure that the investigation data are sufficient in quality (e.g., quality assurance procedures have been followed) and quantity to describe the nature and extent of contamination, potential threat to human health and/or the environment, and to support a Corrective Measures Study, if necessary.

V.E.3.c. The Department will review the Final RFI Report(s), and notify the Permittee of the need for further investigative action and/or the need for a Corrective Measures Study to meet the requirements of V.G and R.61-79.264.101. The Department will notify the Permittee of any no further action decision. Any further investigative action required by the Department shall be prepared and submitted in accordance with a schedule specified by the Department and approved in accordance with Condition V.E.1.c.

V.F. **INTERIM MEASURES (IM)**

V.F.1. IM Work Plan

V.F.1.a. Upon notification by the Department, the Permittee shall prepare and submit an Interim Measures (IM) Work Plan for any SWMU or AOC which the Department determines is necessary. IM are necessary in order to minimize or prevent the further migration of contaminants and limit human and environmental exposure to contaminants while long-term corrective action remedies are evaluated and, if necessary, implemented. The IM Work Plan shall be submitted within thirty (30) calendar days of such notification and shall include the elements listed in V.F.1.b. Such interim measures may be conducted concurrently with investigations required under the terms of this permit. The Permittee may initiate IM by submitting an IM Work Plan for approval and reporting in accordance with the requirements under Condition V.F.

V.F.1.b. The IM Work Plan shall ensure that the interim measures are designed to mitigate any current or potential threat(s) to human health or the environment and are consistent with and integrated into any long-term solution at the facility. The IM Work Plan shall include: the interim measures objectives, procedures for implementation (including any designs, plans, or specifications), and schedules for implementation.

V.F.1.c. The IM Work Plan must be approved by the Department, in writing, prior to implementation. The Department shall specify the start date of the IM Work Plan

schedule in the letter approving the IM Work Plan. If the Department disapproves the IM Work Plan, the Department shall either (1) notify the Permittee in writing of the IM Work Plan's deficiencies and specify a due date for submission of a revised IM Work Plan, (2) revise the IM Work Plan and notify the Permittee of the revisions and the start date of the schedule within the approved IM Work Plan, or (3) conditionally approve the IM Work Plan and notify the Permittee of the conditions.

V.F.2. IM Implementation

V.F.2.a. The Permittee shall implement the interim measures in accordance with the approved IM Work Plan.

V.F.2.b. The Permittee shall give notice to the Department as soon as possible of any planned changes, reductions or additions to the IM Work Plan.

V.F.2.c. Final approval of corrective action required under R.61-79-264.101 which is achieved through interim measures shall be in accordance with R.61-79.270.41 and Condition V.H as a permit modification.

V.F.3. IM Reports

V.F.3.a. If the time required for completion of interim measures is greater than one year, the Permittee shall provide the Department with progress reports at intervals specified in the approved Work Plan. The Progress Reports shall contain the following information at a minimum:

i. A description of the portion of the interim measures completed;
ii. Summaries of any deviations from the IM Work Plan during the reporting period;

iii. Summaries of any problems or potential problems encountered during the reporting period;

iv. Projected work for the next reporting period; and

v. Copies of laboratory/monitoring data.

V.F.3.b. The Permittee shall prepare and submit to the Department, within ninety (90) calendar days of completion of interim measures conducted under Condition V.F, an Interim Measures (IM) Report. The IM Report shall contain the following information at a minimum:

i. A description of interim measures implemented;

ii. Summaries of results;

iii. Summaries of all problems encountered;

iv. Summaries of accomplishments and/or effectiveness of interim measures; and

v. Copies of all relevant laboratory/monitoring data, etc. in accordance with Condition I.E.10.

V.G. **CORRECTIVE MEASURES STUDY**

V.G.1. Corrective Measures Study (CMS) Work Plan

V.G.1.a. The Permittee shall prepare and submit a CMS Work Plan for those units requiring a CMS within ninety (90) calendar days of notification by the Department or whenever the Permittee determines that a CMS is required. This CMS Work Plan shall be developed to meet the requirements of Condition V.G.1.b.

V.G.1.b. The CMS Work Plan shall meet the requirements of Appendix C at a minimum. The CMS Work Plan shall include schedules of implementation and completion of specific actions necessary to complete a CMS. The Permittee must provide sufficient justification and/or documentation for any unit deleted from the CMS Work Plan. Such deletion of a unit is subject to the approval of the Department. The CMS shall be conducted in accordance with the approved CMS Work Plan. The Permittee shall provide sufficient written justification for any omissions or deviations from the minimum requirements of Appendix C. Such omissions or deviations are subject to the approval of the Department. The scope of the CMS Work Plan shall include all investigations necessary to ensure compliance with 3005(c)(3), R.61-79.264.101, 264.552, and 270.32(b)(2). The Permittee shall implement corrective actions beyond the facility boundary, as set forth in Condition V.A.5.

V.G.1.c. The Department shall either approve or disapprove, in writing, the CMS Work Plan. If the Department disapproves the CMS Work Plan, the Department shall either (1) notify the Permittee in writing of the CMS Work Plan's deficiencies and specify a due date for submittal of a revised CMS Work Plan, (2) revise the CMS Work Plan and notify the Permittee of the revisions, or (3) conditionally approve the CMS Work Plan and notify the Permittee of the conditions. This modified CMS Work Plan becomes the approved CMS Work Plan.

V.G.2. Corrective Measures Study Implementation

The Permittee shall begin to implement the Corrective Measures Study according to the schedules specified in the CMS Work Plan, no later than thirty (30) calendar days after the Permittee has received written approval from the Department for the CMS Work Plan. Pursuant to Permit Condition V.G.1.b. the CMS shall be conducted in accordance with the approved CMS Work Plan.

V.G.3. CMS Report

V.G.3.a. The Permittee shall prepare and submit to the Department a draft and final CMS Report for the study conducted pursuant to the approved CMS Work Plan. The draft CMS Report shall be submitted to the Department in accordance with the schedule in the approved CMS Work Plan. The final CMS Report shall be submitted to the Department within thirty (30) days of receipt of the Department's comments on the draft CMS Report. The CMS Report shall summarize any bench-scale or pilot tests conducted. The CMS Report must include an evaluation of each remedial alternative. If a remedial alternative requires the use of a CAMU, the CMS report shall include all information necessary to establish and implement the CAMU. The CMS Report shall present all information gathered under the approved CMS Work Plan. The CMS Final Report must contain adequate information to support the Department's decision on the recommended remedy, described under Permit Condition V.H.

V.G.3.b. If the Department determines that the CMS Final Report does not fully satisfy the information requirements specified under Permit Condition V.G.3.a, the Department may disapprove the CMS Final Report. If the Department disapproves the CMS Final Report, the Department shall notify the Permittee in writing of deficiencies in the CMS Final Report and specify a due date for submittal of a revised CMS Final Report. The Department will notify the Permittee of any no further action decision.

V.G.3.c. As specified under Permit Condition V.G.3.b, based on preliminary results and the CMS Final Report, the Department may require the Permittee to evaluate additional remedies or particular elements of one or more proposed remedies.

V.H. **REMEDY APPROVAL AND PERMIT MODIFICATION**

V.H.1. A remedy shall be selected from the remedial alternatives evaluated in the CMS as per Condition V.G. for SWMUs identified in Conditions V.A.3. and V.B.4. It will be based at a minimum on protection of human health and the environment, as per specific site conditions, existing regulations, and guidance. The selected remedy may include any interim measures implemented to date.

V.H.2. Pursuant to R.61-79.270.41, a permit modification will be initiated by the Department after recommendation of a remedy under Condition V.H.2. This modification will serve to incorporate a final remedy, including a CAMU if necessary, into this permit.

V.H.3. Within one hundred and twenty (120) calendar days after this Permit has been modified; the Permittee shall demonstrate financial assurance for completing the approved remedy.

V.I. **MODIFICATION OF THE CORRECTIVE ACTION SCHEDULE OF COMPLIANCE**

V.I.1. If at any time the Department determines that modification of the Corrective Action Schedule of Compliance is necessary, the Department may initiate a modification to the Schedule of Compliance (Appendix D).

V.I.2. Modifications that are initiated and finalized by the Department will be in accordance with the applicable provisions of R.61-79.270. The Permittee may also request a permit modification in accordance with R.61-79.270 to change the Schedule of Compliance.

V.J. **IMMINENT HAZARDS**

V.J.l. The Permittee shall report to the Department any imminent or existing hazard to public health or the environment from any release of hazardous waste or hazardous constituents. Such information shall be reported orally within 24 hours from such time the Permittee becomes aware of the circumstances. This report shall include the information specified under Conditions I.E.15.a and b.

V.J.2. A written report shall also be provided to the Department within fifteen (15) calendar days of the time the Permittee becomes aware of the circumstances. The written report shall contain the information specified under Conditions I.E.15.a and b; a description of the release and its cause; the period of the release; whether the release has been stopped; and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the release.

V.K. **WORK PLAN AND REPORT REQUIREMENTS**

V.K.1. All work plans and schedules shall be subject to approval by the Department prior to implementation to assure that such work plans and schedules are consistent with the requirements of this Permit and with applicable regulations and guidance. The Permittee shall revise all submittals and schedules as specified by the Department. Upon approval the Permittee shall implement all work plans and schedules as written.

V.K.2. All work plans and reports shall be submitted in accordance with the approved schedule. Extensions of the due date for submittals may be granted by the Department based on the Permittee's demonstration that sufficient justification for the extension exists.

V.K.3. If the Permittee at any time determines that the SAR information required under Condition V.B, the CS Work Plan under Condition V.D, or RFI Work Plan(s) required under Condition V.E no longer satisfy the requirements of R.61-79.264.101 or this permit for prior or continuing releases of hazardous waste or hazardous constituents from solid waste management units and/or areas of concern, the Permittee shall submit an amended RFI Work Plan(s) to the Department within ninety (90) calendar days of such determination.

V.K.4. All reports shall be signed and certified in accordance with R.61-79.270.11.

V.K.5. Three (3) copies of all reports and work plans shall be provided by the Permittee to the Department in care of the Division Director at the following address:

Richard A. Haynes, P.E., Director
South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
Division of Waste Management
2600 Bull Street
Columbia, SC 29201

V.L. **APPROVAL/DISAPPROVAL OF SUBMITTALS**

V.L.1. The Department will review the work plans, reports, schedules, and other documents ("submittals") which require the Department's approval in accordance with the conditions of this permit. The Department will notify the Permittee in writing of any submittal that is disapproved, and the basis therefore. Condition V.M. shall apply only to submittals that have been disapproved and revised by the Department, or that have been disapproved by the Department, then revised and resubmitted by the Permittee, and again disapproved by the Department.

V.M.2. **DISPUTE RESOLUTION**

Notwithstanding any other provision in this permit, in the event the Permittee disagrees, in whole or in part, with the Department's revision of a submittal or disapproval of any revised submittal required by the permit, the following may, at the Permittee's discretion apply:

V.M.1.a. In the event that the Permittee chooses to invoke the provisions of this section, the Permittee shall notify the Department in writing within thirty (30) days of receipt of the Department's revision of a submittal or disapproval of a revised submittal. Such notice shall set forth the specific matters in dispute, the position the Permittee asserts should be adopted as consistent with the requirements of the permit, the basis for the Permittee's position, and any matters considered necessary for the Department's determination.

V.M.1.b. The Department and the Permittee shall have an additional thirty (30) days from the Department's receipt of the notification provided for in Condition V.M.1.a. to meet or confer to resolve any disagreement.

V.M.1.c. In the event agreement is reached, the Permittee shall submit the revised submittal and implement the same in accordance with and within the time frame specified in such agreement.

V.M.1.d. If agreement is not reached within the thirty (30) day period, the Department will notify the Permittee in writing of his/her decision on the dispute, and the Permittee shall comply with the terms and conditions of the Department's decision in the dispute. For the purposes of this provision in this permit, the responsibility for making this decision shall not be delegated below the Bureau Chief.

V.M.1.e. With the exception of those conditions under dispute, the Permittee shall proceed

to take any action required by those portions of the submission and of the permit that the Department determines are not affected by the dispute.

MODULE VI - WASTE MINIMIZATION

VI.A. **GENERAL RESTRICTIONS**

VI.A.1. In the event that the Permittee treats, stores, or disposes of hazardous wastes on-site where such wastes were generated, then the Permittee must comply with R.61-79.264.73(b)(9), and Section 3005(h) of RCRA (42 U.S.C. 6925(h)), and the Permittee must certify, no less often than annually, that:

VI.A.1.a. The Permittee has a program in place to reduce the volume and toxicity of hazardous waste generated to the degree determined by the Permittee to be economically practicable; and

VI.A.1.b. The proposed method of treatment, storage or disposal is the most practicable method available to the Permittee which minimizes the present and future threat to human health and the environment.

VI.B. **RECORDING REQUIREMENTS**

If Condition VI.A. is applicable, then the Permittee shall maintain copies of this certification in the facility operating record as required by R.61-79.264.73(b)(9).

VI.C. **WASTE MINIMIZATION OBJECTIVES**

If Condition VI.A. is applicable, then the Waste Minimization program required under Condition VI.A. should address the objectives listed in Appendix E.

MODULE VII - LAND DISPOSAL RESTRICTIONS

VII.A. **GENERAL RESTRICTIONS**

VII.A.1. R.61-79 Part 268 identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise prohibited waste may continue to be placed on or in a land treatment, storage or disposal unit. The Permittee shall maintain compliance with the requirements of R.61-79 Part 268. Where the Permittee has applied for an extension, waiver or variance under R.61-79 Part 268, the Permittee shall comply with all restrictions on land disposal under this Part once the effective date for the waste has been reached pending final approval of such application.

VII.B. **LAND DISPOSAL PROHIBITIONS AND TREATMENT STANDARDS**

VII.B.1. A restricted waste identified in R.61-79 Part 268 Subpart C may not be placed in a land disposal unit without further treatment unless the requirements of R.61-79 Part 268 Subparts C and/or D are met.

VII.B.2. The storage of hazardous wastes restricted from land disposal under R.61-79 Part 268 is prohibited unless the requirements of R.61-79 Part 268 Subpart E are met.

APPENDIX A – SOLID WASTE MANAGEMENT UNIT AND AREA OF CONCERN SUMMARY

A.1. Summary of solid waste management units (SWMUs) and areas of concern (AOCs) as listed in the RFA Report and identified since the 1988 Permit.

SWMU/AOC No/Letter	Unit Description
SWMU No.01	Concentrated Waste Holding Tank #1
SWMU No.02	Concentrated Waste Holding Tank #2
SWMU No.03	Batch Treatment Tank
SWMU No.04	Sludge Tank
SWMU No.05	Filter Press and Sludge Feed Pump
SWMU No.06	Rinse Water Holding Tank #1
SWMU No.07	Rinse Water Holding Tank #2
SWMU No.08	Cyanide Destruction Unit #1
SWMU No.09	Cyanide Destruction Unit #2
SWMU No.10	Ferric Chloride Mixing Tank
SWMU No.11	Slant Tube Clarifier
SWMU No.12	Sludge Drying Bed # 1
SWMU No.13	Sludge Drying Bed # 2
SWMU No.14	Copper Hydroxide Landfill #1
SWMU No.15	Copper Hydroxide Landfill #2
SWMU No.16	Industrial Wastewater Lagoon #1
SWMU No.17	Industrial Wastewater Lagoon #2
SWMU No.18	Industrial Wastewater Lagoon #3
SWMU No.19	Industrial Wastewater Lagoon #4
SWMU No.20	pH Adjustment Tank
SWMU No.21	Industrial Wastewater Lagoon #5
SWMU No.22	Industrial Wastewater Lagoon #6
SWMU No.23	Parshall Flume
SWMU No.24	Industrial Waste Landfill #1
SWMU No.25	Industrial Waste Landfill #2
SWMU No.26	Industrial Waste Landfill #3
SWMU No.27	Debris Landfill
SWMU No.28	Surface Impoundment #1
SWMU No.29	Surface Impoundment #2
SWMU No.30	Surface Impoundment #3
SWMU No.31	Surface Impoundment #4
SWMU No.32	Surface Impoundment #5

Appendix A.1. cont..

A.1. Summary of solid waste management units (SWMUs) and areas of concern (AOCs) as listed in the RFA Report and identified since the 1988 Permit.	
SWMU/AOC No/Letter	Unit Description
SWMU No.33	Abandoned Surface Impoundment
SWMU No.34	Waste Oil Storage Tank #1
SWMU No.35	Waste Oil Storage Tank #2
SWMU No.36	Container Storage Area
SWMU No.37	All Underground Piping Carrying Haz Waste or Haz Constituents
SWMU No.38	Final Clarifier
SWMU No.39	V-Notch Weir Chamber
SWMU No.40	Concentrated Waste Sump
SWMU No.41	Intermediate Drum Loading Area
SWMU No.42	Degreaser Waste Holding Tank
SWMU No.43	Fluoride Waste Holding Tank
SWMU No.44	Fluoride Sludge Filter Press
SWMU No.45	Coolant Treatment System
SWMU No.46	Stormwater Lagoon
SWMU No.47	Cyanide Release Spill Area
SWMU No.48	Underground Storage Tank Area
SWMU No.49	Cutting Oil Release
SWMU No. 50	Training Center Septic System (as part of SWMA H)
SWMU No. 51	USTs Removed in 1972 (as part of SWMA H)
AOC 1	Cyanide Trenches in the Plating Department

A.2. List of solid waste management units (SWMUs) which are RCRA Regulated Units and are addressed under this RCRA Permit.	
SWMU/AOC No/Letter	Unit Description
SWMU No.11	Sludge Drying Beds 1 & 2
SWMU No.12	Copper Hydroxide Landfill 2
SWMU No.13	Surface Impoundments A, B, C, D, E

A.3. List of solid waste management units (SWMUs) and areas of concern (AOCs) requiring Phase II RFI Investigation (inside the Manufacturing Building)	
SWMU/AOC No/Letter	Unit Description
SWMU No.07	All Underground Piping carrying Haz Waste
SWMU No.14	Coolant Treatment System
SWMU No.16	Underground Storage Tank and Freon Release Area
SWMU No.17	Cutting Oil Release
SWMU N. 51	Former USTs Removed in 1972
AOC No. 1	Cyanide Trenches in the Plating Department

A.4. List of solid waste management units (SWMUs) performing Corrective Action under an Approved Remedy and requiring Land Use Controls (LUCs) addressed under this RCRA Permit (outside the Manufacturing Building).	
SWMU/AOC No/Letter	Unit Description
SWMU No.01	Batch Treatment Tank
SWMU No.02	Cyanide Destruction Units 1 & 2
SWMU No.03	Ind Wastewater Lagoons A, B, C, D, E, F
SWMU No.04	Industrial Waste Landfills A, B, C
SWMU No.05	Debris Landfill
SWMU No.06	Abandoned Surface Impoundment
SWMU No.08	Copper Hydroxide Landfill 1
SWMU No.09	Final Clarifier
SWMU No.10	Stormwater Lagoon
SWMU No.11	Sludge Drying Beds 1 & 2
SWMU No.12	Copper Hydroxide Landfill 2
SWMU No.13	Surface Impoundments A, B, C, D, E
SWMU No.15	Waste Oil Storage Tank Area
SWMU No.18	Cyanide Release Spill0

Corrective Action under Approved Remedy and requiring Land Use Controls (LUCs):

1. The RCRA Caps installed to cover the closed HWMUs
2. Boundary and internal groundwater extraction and treatment downgradient of the closed HWMUs and SWMA G (recovery Wells R-1 through R-12R)

3. Groundwater extraction and treatment from recovery wells R-13 and R-16 in SWMA G
4. Boundary groundwater extraction and treatment downgradient of SWMA H (recovery wells R-17 and R-18)
5. The air sparging/soil vapor extraction (AS/SVE) system installed as an IM near the former closed USTs in SWMU 15 (SWMA H) with subsequent installation and operation of recovery well R-19, located in the area of the former closed USTs in SWMU 15 to capture groundwater impacted by releases from SWMU 15 (SWMA H)
6. Establish institutional controls to prohibit residential, agricultural or industrial use of the site groundwater over the entire footprint of the site.
7. Establish institutional controls within the areas depicted in Figures 33 and 34(in the document referenced below) requiring that future facility investigations, corrective actions, and site development and construction-related activities be planned and designed considering potential environmental exposures and be conducted under a project-specific health and safety plan and after notification to SCDHEC.

REFERENCE 1: Correspondence dated October 18, 2012 from D. Sordi, Ingersol Rand Company to L. Garner, DHEC entitled "Corrective Measures Study Report for Areas Outside the Former Manufacturing Building"for the Timken US LLC Facility

APPENDIX B - RCRA FACILITY INVESTIGATION (RFI) WORK PLAN OUTLINE

I. RFI WORK PLAN REQUIREMENTS

The Permittee shall prepare a RCRA Facility Investigation (RFI) Work Plan that meets the requirements of Part II of this appendix and the RFI Guidance, EPA-530/SW-89-031. This Work Plan shall also include the development of the following plans, which shall be prepared concurrently:

A. Project Management Plan

Permittee shall prepare a Project Management Plan which will include a discussion of the technical approach, schedules and personnel. The Project Management Plan will also include a description of qualifications of personnel performing or directing the RFI, including contractor personnel. This plan shall also document the overall management approach to the RCRA Facility Investigation.

B. Sampling and Analysis Plan(s)

The Permittee shall prepare a plan to document all monitoring procedures: field sampling, sampling procedures and sample analysis performed during the investigation to characterize the environmental setting, source, and releases of hazardous constituents, so as to ensure that all information and data are valid and properly documented. The Sampling Strategy and Procedures shall be in accordance with EPA Region IV Environmental Compliance Branch's Standard Operating Procedure and Quality Assurance Manual (SOP) (most recent version). Any deviations from this reference must be requested by the applicant and approved by EPA. The Sampling and Analysis Plan must specifically discuss the following unless the SOP procedures are specifically referenced.

1. Sampling Strategy
    a. Selecting appropriate sampling locations, depths, etc.;
    b. Obtaining all necessary ancillary data;
    c. Determining conditions under which sampling should be conducted;
    d. Determining which media are to be sampled (e.g., groundwater, air, soil, sediment, subsurface gas);
    e. Determining which parameters are to be measured and where;
    f. Selecting the frequency of sampling and length of sampling period;
    g. Selecting the types of samples (e.g., composites vs. grabs) and number of samples to be collected.

2. Sampling Procedures
    a. Documenting field sampling operations and procedures, including;

i) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters, preservatives, and absorbing reagents);
ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;
iii) Documentation of specific sample preservation method;
v) Calibration of field instruments;
v) Submission of field-biased blanks, where appropriate;
vi) Potential interferences present at the facility;
vii) Construction materials and techniques, associated with monitoring wells and piezometers;
viii) Field equipment listing and sampling containers;
ix) Sampling order; and
x) Decontamination procedures.

b. Selecting appropriate sample containers;
c. Sampling preservation; and
d. Chain-of-Custody, including:
i) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and
ii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

3. Sample Analysis

Sample analysis shall be conducted in accordance with SW-846: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods" (most recent version). The sample analysis section of the Sampling and Analysis Plan shall specify the following:

a. Chain-of-Custody procedures, including:
i) Identification of a responsible party to act as sampling custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;
ii) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and
iii) Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.
b. Sample storage;
c. Sample preparation methods;

d. Analytical Procedures, including:
    i) Scope and application of the procedure;
    ii) Sample matrix;
    iii) Potential interferences;
    iv) Precision and accuracy of the methodology; and
    v) Method detection limits.
e. Calibration procedures and frequency;
f. Data reduction, validation and reporting;
g. Internal quality control checks, laboratory performance and systems audits and frequency, including:
    i) Method blank(s);
    ii) Laboratory control sample(s);
    iii) Calibration check sample(s);
    iv) Replicate sample(s);
    v) Matrix-spiked sample(s);
    vii) Control charts;
    viii) Surrogate samples;
    ix) Zero and span gases; and
    x) Reagent quality control checks.
h. External quality control checks by the Department including:
    i) Spikes and blanks at sampling events for which the Department or its technical representative provides oversight; and
    ii) The equivalent of a CLP data package for samples split with the Department or for which the Department specifically requests the package.
i. Preventive maintenance procedures and schedules;
j. Corrective action (for laboratory problems); and
k. Turnaround time.

C. Data Management Plan

The Permittee shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation.

1. Data Record

The data record shall include the following:

a. Unique sample or field measurement code;
b. Sampling or field measurement location and sample or measurement type;
c. Sampling or field measurement raw data;
d. Laboratory analysis ID number;
e. Property or component measures; and
f. Result of analysis (e.g. concentration).

2. Tabular Displays

The following data shall be presented in tabular displays:

a. Unsorted (raw) data;
b. Results for each medium, or for each constituent monitored;
c. Data reduction for statistical analysis, as appropriate;
d. Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and
e. Summary data

3. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transits, three dimensional graphs, etc.):

a. Display sampling location and sampling grid:
b. Indicate boundaries of sampling area, and area where more data are required;
c. Display geographical extent of contamination;
d. Illustrate changes in concentration in relation to distances from the source, time, depth or other parameters; and
e. Indicate features affecting inter-media transport and show potential receptors.

II. **RCRA Facility Investigation (RFI) Requirements**

RCRA Facility Investigation:

The Permittee shall conduct those investigations necessary to: characterize the facility (Environmental Setting); define the source (Source Characterization); define the degree and extent of release of hazardous constituents (Contamination Characterization); and identify actual or potential receptors.

The investigations should result in data of adequate technical content and quality to support the development and evaluation of the corrective action plan if necessary. The information contained in previously developed documents such as a RCRA Part B permit application and/or RCRA Section 3019 Exposure Information Report may be referenced as appropriate, but must be summarized in both the RFI Work Plan and RFI Report.

All sampling and analyses shall be conducted in accordance with the Sampling and Analysis Plan. All sampling locations shall be documented in a log and identified on a detailed site map.

A. Environmental Setting

The Permittee shall collect information to supplement and/or verify Part B information on the environmental setting at the facility. The Permittee shall characterize the following as they relate to identified sources, pathways and areas of releases of hazardous constituents from Solid Waste Management Units.

1. Hydrogeology

The Permittee shall conduct a program to evaluate hydrogeologic conditions at the facility. This program shall provide the following information:

a. A description of the regional and facility specific geologic and hydrogeologic characteristics affecting ground-water flow beneath the facility, including:

i) Regional and facility specific stratigraphy: description of strata including strike and dip, identification of stratigraphic contacts;

ii) Structural geology: description of local and regional structural features (e. g., folding, faulting, tilting, jointing, etc.);

iii) Depositional history;

iv) Regional and facility specific ground-water flow patterns; and

v) Identification and characterization of areas and amounts of recharge and discharge.

b. An analysis of any topographic features that might influence the ground-water flow system.

c. Based on field data, tests, and cores, a representative and accurate

classification and description of the hydrogeologic units which may be part of the migration pathways at the facility (i. e., the aquifers and any intervening saturated and unsaturated units), including:

i) Hydraulic conductivity and porosity (total and effective);
ii) Lithology, grain size, sorting, degree of cementation;
iii) An interpretation of hydraulic interconnections between saturated zones; and
iv) The attenuation capacity and mechanisms of the natural earth materials (e. g., ion exchange capacity, organic carbon content, mineral content etc.).

d. Based on data obtained from groundwater monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source, a representative description of water level or fluid pressure monitoring including:

i) Water-level contour and/or potentiometric maps;
ii) Hydrologic cross sections showing vertical gradients;
iii) The flow system, including the vertical and horizontal components of flow; and
iv) Any temporal changes in hydraulic gradients, for example, due to tidal or seasonal influences.

e. A description of man-made influences that may affect the hydrology of the site, identifying:

i) Local water-supply and production wells with an approximate schedule of pumping; and

ii) Man-made hydraulic structures (pipelines, french drains, ditches, etc.).

2. Soils

The Permittee shall conduct a program to characterize the soil and rock units above the water table in the vicinity of contaminant release(s). Such characterization may include, but not be limited to, the following types of information as appropriate:

a. Surface soil distribution;
b. Soil profile, including ASTM classification of soils;
c. Transect of soil stratigraphy;
d. Hydraulic conductivity (saturated and unsaturated);
e. Relative permeability;
f. Bulk density;
g. Porosity;
h. Soil sorption capacity;
i. Cation exchange capacity (CEC);
j. Soil organic content;
k. Soil pH;
l. Particle size distribution;
m. Depth of water table;
n. Moisture content;
o. Effect of stratification on unsaturated flow;
p. Infiltration;
q. Evapotranspiration;
r. Storage capacity;
s. Vertical flow rate; and
t. Mineral content.

3. Surface Water and Sediment

The Permittee shall conduct a program to characterize the surface water bodies in the vicinity of the facility. Such characterization may include, but not be limited to, the following activities and information:

a. Description of the temporal and permanent surface water bodies including:

i) For lakes and estuaries: location, elevation, surface area, inflow, outflow, depth, temperature stratification, and volume;
ii) For impoundments: location, elevation, surface area, depth, volume, freeboard, and construction and purpose;
iii) For streams, ditches, and channels: location, elevation, flow,

velocity, depth, width, seasonal fluctuations, flooding tendencies (i. e., 100 year event), discharge point(s), and general contents.

iv) Drainage patterns; and
v) Evapotranspiration.

b. Description of the chemistry of the natural surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, biological oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients, chemical oxygen demand, total organic carbon, specific contaminant concentrations, etc.

c. Description of sediment characteristics including:

i) Deposition area;
ii) Thickness profile; and
iii) Physical and chemical parameters (e. g., grain size, density, organic carbon content, ion exchange capacity, pH, etc.)

4. Air

The Permittee shall provide information characterizing the climate in the vicinity of the facility. Such information may include, but not be limited to:

a. A description of the following parameters:
i) Annual and monthly rainfall averages;
ii) Monthly temperature averages and extremes;
iii) Wind speed and direction;
iv) Relative humidity/dew point;
v) Atmospheric pressure;
vi) Evaporation data;
vii) Development of inversions; and
viii) Climate extremes that have been known to occur in the vicinity of the facility, including frequency of occurrence. (i. e. Hurricanes)

b. A description of topographic and man-made features which affect air flow and emission patterns, including:

i) Ridges, hills or mountain areas;
ii) Canyons or valleys;
iii) Surface water bodies (e. g. rivers, lakes, bays, etc.); and
iv) Buildings.

B. Source Characterization

For those sources from which releases of hazardous constituents have been detected the Permittee shall collect analytical data to completely characterize the wastes and the areas where wastes have been placed, to the degree that is possible without undue safety risks, including: type, quantity; physical form; disposition (containment or nature of deposits); and facility characteristics affecting release (e. g., facility security, and engineering barriers). This shall include quantification of the following specific characteristics, at each source area:

1. Unit/Disposal Area Characteristics:

a. Location of unit/disposal area;
b. Type of unit/disposal area;
c. Design features;
d. Operating practices (past and present)
e. Period of operation;
f. Age of unit/disposal area;
g. General physical conditions; and
h. Method used to close the unit/disposal area.

2. Waste Characteristics:

a. Type of wastes placed in the unit;
i) Hazardous classification (e. g., flammable, reactive, corrosive, oxidizing or reducing agent);
ii) Quantity; and
iii) Chemical composition.

b. Physical and chemical characteristics such as;
i) Physical form (solid, liquid, gas);

ii) Physical description (e. g., powder, oily sludge);
iii) Temperature;
iv) pH;
v) General chemical class (e. g., acid, base, solvent);
vi) Molecular weight;
vii) Density;
viii) Boiling point;
ix) Viscosity;
x) Solubility in water;
xi) Cohesiveness of the waste; and
xii) Vapor pressure.

c. Migration and dispersal characteristics of the waste such as:
i) Sorption capability;
ii) Biodegradability, bioconcentration, biotransformation;
iii) Photodegradation rates;
iv) Hydrolysis rates; and
v) Chemical transformations.

The Permittee shall document the procedures used in making the above determinations.

C. Characterization of Releases of Hazardous Constituents

The Permittee shall collect analytical data on groundwater, soils, surface water, sediment, and subsurface gas contamination in the vicinity of the facility in accordance with the sampling and analysis plan as required above. These data shall be sufficient to define the extent, origin, direction, and rate of movement of contamination. Data shall include time and location of sampling, media sampled, concentrations found, conditions during sampling, and the identity of the individuals performing the sampling and analysis. The Permittee shall address the following types of contamination at the facility:

1. Groundwater Contamination

The Permittee shall conduct a groundwater investigation to characterize any plumes of contamination detected at the facility. This investigation shall at a minimum provide the following information:

a. A description of the horizontal and vertical extent of any plume(s) of

hazardous constituents originating from or within the facility;

b. The horizontal and vertical direction of contamination movement;
c. The velocity of contaminant movement;
d. The horizontal and vertical concentration profiles of hazardous constituents in the plume(s);
e. An evaluation of factors influencing the plume movement; and
f. An extrapolation of future contaminant movement.

The Permittee shall document the procedures used in making the above determinations (e. g., well design, well construction, geophysics, modeling, etc.).

2. Soil Contamination

The Permittee shall conduct an investigation to characterize the contamination of the soil and rock units above the saturated zone in the vicinity of any contaminant release. The investigation may include the following information:

a. A description of the vertical and horizontal extent of contamination;
b. A description of appropriate contaminant and soil chemical properties within the contaminant source area and plume. This may include contaminant solubility, speciation, absorption, leachability, exchange capacity, biodegradability, hydrolysis photolysis, oxidation and other factors that might affect contaminant migration and transformation;
c. Specific contaminant concentrations;
d. The velocity and direction of contaminant movement; and
e. An extrapolation of future contaminant movement.

The Permittee shall document the procedures used in making the above determinations.

3. Surface Water and Sediment Contamination

The Permittee shall conduct a surface water investigation to characterize contamination in surface water bodies resulting from releases of hazardous constituents at the facility. The investigation may include, but not be limited to, the following information:

a. A description of the horizontal and vertical extent of any plume(s) originating from the facility, and the extent of contamination in underlying sediments;

b. The horizontal and vertical direction of contaminant movement;
c. The contaminant velocity;
d. An evaluation of the physical, biological and chemical factors influencing contaminant movement;
e. An extrapolation of future contaminant, movement; and
f. A description of the chemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, specific contaminant concentrations, etc.

4. Air Contamination

The Permittee shall conduct an investigation to characterize gaseous releases of hazardous constituents into the atmosphere or any structures or buildings. This investigation may provide the following information:

a. A description of the horizontal and vertical direction and velocity of contaminant movement;
b. The rate and amount of the release; and
c. The chemical and physical composition of the contaminant(s) released, including horizontal and vertical concentration profiles.

The Permittee shall document the procedures used in making the above determinations.

D. Potential Receptors

The Permittee shall collect data describing the human populations and environmental systems that are susceptible to contaminant exposure from the facility. Chemical analysis of biological samples and/or data on observable effects in ecosystems may also be obtained as appropriate. The following characteristics shall be identified:

1. Current local uses and planned future uses of groundwater:

a. Type of use (e. g., drinking water source: municipal or residential, agricultural, domestic/non-potable, and industrial); and
b. Location of ground water users, to include withdrawal and discharge wells, within one mile of the impacted area.

The above information should also indicate the aquifer or hydrogeologic unit

used and/or impacted for each item.

2. Current local uses and planned future uses of surface waters directly impacted by the facility:

    a. Domestic and municipal (e. g., potable and lawn/gardening watering);
    b. Recreational (e. g. swimming, fishing);
    c. Agricultural;
    d. Industrial; and
    e. Environmental (e. g., fish and wildlife propagation).

3. Human use of or access to the facility and adjacent lands, including but not limited to:

    a. Recreation;
    b. Hunting;
    c. Residential;
    d. Commercial; and
    e. Relationship between population locations and prevailing wind direction.

4. A general description of the biota in surface water bodies on, adjacent to, or affected by the facility.

5. A general description of the ecology within the area adjacent to the facility.

6. A general demographic profile of the people who use and have access to the facility and adjacent land, including, but not limited to: age; sex; and sensitive subgroups.

7. A description of any known or documented endangered or threatened species near the facility.

APPENDIX C - CORRECTIVE MEASURE STUDY (CMS) OUTLINE

The purpose of the CMS portion of the RCRA corrective action process is to identify and evaluate potential remedial alternatives for the release(s) of hazardous constituents that have been identified at the facility through the RFI or other investigations. The scope and requirements of the CMS should be balanced with the expeditious initiation of remedies and rapid restoration of contaminated media. The scope and requirements of the CMS should be focused to fit the complexity of the site-specific situation. Facilities with complex environmental problems may need to evaluate a number of technologies and corrective measure alternatives. For other facilities, however, the evaluation of a single corrective measure alternative may be adequate. Therefore, a streamlined or focused approach to the CMS may be initiated. Information gathered during any interim measures will be used to augment the CMS and in cases where corrective action goals are met, may be a substitute for the final CMS.

Regardless of whether a streamlined/focused or a detailed CMS is required, a CMS Work Plan and CMS Report are generally required. The requirements for a full, detailed CMS are listed below. The Department has the flexibility not to require sections of the plan and/or report, where site-specific situations indicate that all requirements are not necessary. The Department may require additional studies to support the CMS.

I. Corrective Measures Study (CMS) Work Plan

A. Elements of the CMS Work Plan

The Corrective Measures Study (CMS) Work Plan shall include at a minimum the following elements:

1. A site-specific description of the overall purpose of the CMS;

2. A description of the corrective measures objectives, including proposed target media cleanup standards (e.g., promulgated federal and state standards) and preliminary points of compliance or a description of how a risk assessment will be performed (e.g., guidance documents);

3. A description of the specific corrective measure technologies and/or corrective measure alternatives which will be studied;

4. A description of the general approach to investigating and evaluating

potential corrective measures;

5. A detailed description of any proposed pilot, laboratory and/or bench scale studies;
6. A proposed outline for the CMS Report including a description of how information will be presented;

7. A description of overall project management including overall approach, levels of authority (include organization chart), lines of communication, project schedules, budget and personnel. Include a description of qualifications for personnel directing or performing the work;

8. A project schedule that specifies all significant steps in the process and when key documents (e.g. CMS Progress Reports,
draft CMS Report) are to be submitted to the Department;

9. A detailed Public Involvement Plan.

II. **Corrective Measures Study Report**

The detail of a CMS may vary based upon the complexity of the site and any on-going Interim Measures. However, the CMS Report may include the following elements:

A. Introduction/Purpose

The Permittee shall describe the purpose of the CMS Report and provide a summary description of the project.

B. Description of Current Situation

The Permittee shall submit a summary and update the information regarding the known nature and extent of the contamination as documented in the RCRA Facility Investigation (RFI) Report by describing the current situation at the facility. This discussion should concentrate on those issues which could significantly affect the evaluation and selection of the corrective measures alternative(s). The Permittee shall provide an update to information presented in the RFI regarding previous response activities and interim measures which have or are being implemented at the facility. The Permittee shall also make a facility-specific statement of the purpose for the response, based on the results of the RFI. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by corrective measures.

C. Establishment of Proposed Media Specific Cleanup Standards

The Permittee shall describe the proposed media cleanup standards and point of compliance. The standards must be either background, promulgated federal and state standards or health based, risk-derived standards. If media clean-up standards are not proposed, then the Department will unilaterally propose setting media clean-up standards to either background, promulgated federal and state standards or the most conservative health based, risk-derived standards.

D. Identification, Screening and Development of Corrective Measure Technologies

1. Identification: List and briefly describe potentially applicable technologies for each affected media that may be used to achieve the corrective action objectives. Include a table that summarizes the available technologies.

   The Permittee should consider innovative treatment technologies, especially in situations where there are a limited number of applicable corrective measure technologies.

2. Screening: The Permittee shall screen the corrective measure technologies to eliminate those that may prove infeasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objective within a reasonable time period. This screening process focuses on eliminating those technologies which have severe limitations for a given set of waste and site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations.

   Site, waste, and technology characteristics which are used to screen inapplicable technologies are described in more detail below:

   a. Site Characteristics: Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration.

   b. Waste Characteristics: Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important

part of the screening process. Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site).

c. Technology Limitations: During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process. For example, certain treatment methods have been developed to a point where they can be implemented in the field without extensive technology transfer or development.

3. Corrective Measure Development: The Permittee shall assemble the technologies that pass the screening step into specific alternatives that have the potential to meet the corrective action objectives for each media. Options for addressing less complex sites could be relatively straight-forward and may only require evaluation of a single or limited number of alternatives. Each alternative may consist of an individual technology or a combination used in sequence (i.e., treatment train). Different alternatives may be considered for separate areas of the facility, as appropriate. List and briefly describe each corrective measure alternative.

E. Evaluation of a Final Corrective Measure Alternative

For each remedy which warrants a more detailed evaluation (i.e., those that passed through the screening step described in I.D.2., including those situations when only one remedy is being proposed, the Permittee shall provide detailed documentation of how the potential remedy will comply with each of the standards listed below. These standards reflect the major technical components of remedies including cleanup of releases, source control and management of wastes that are generated by remedial activities. The specific standards are as follows:

1. Protect human health and the environment.
2. Attain media cleanup standards set by the state.
3. Control the source of releases so as to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment.

4. Comply with applicable standards for management of wastes.
5. Other factors.

In evaluating the selected alternative or alternatives, the Permittee shall prepare and submit information that documents that the specific remedy will meet the standards listed above. The following guidance should be used in completing this evaluation.

1. Protect Human Health and the Environment

   Corrective action remedies must be protective of human health and the environment. Remedies may include those measures that are needed to be protective, but are not directly related to media cleanup, source control or management of wastes. An example would be a requirement to provide alternative drinking water supplies in order to prevent exposures to releases from an aquifer used for drinking water purposes. Therefore, the Permittee shall provide a discussion of any short term remedies necessary to meet this standard, as well as discuss how the corrective measures alternative(s) meet this standard.

2. Attain Media Cleanup Standards

   Remedies will be required to attain media cleanup standards. As part of the necessary information for satisfying this requirement, the Permittee shall address whether the potential remedy will achieve the remediation objectives. An estimate of the time frame necessary to achieve the goals shall be included. Contingent remedies may be proposed if there is doubt if the initial remedy will be successful (e.g., contingent remedies to innovative technologies).

3. Control of Sources of Releases

   The Permittee shall address the issue of whether source control measures are necessary, and if so, the type of actions that would be appropriate. Any source control measure proposed should include a discussion on how well the method is anticipated to work given the particular situation at the facility and the known track record of the specific technology.

4. Comply with Any Applicable Standards for Management of Wastes

The Permittee shall include a discussion of how the specific waste management activities will be conducted in compliance with all applicable state and federal regulations (e.g., closure requirements, LDRs).

5. Other Factors

There are five general factors that will be considered as appropriate by the Department in selecting/approving a remedy that meets the four standards listed above. These five decision factors include:

a. Long-term reliability and effectiveness;
b. Reduction in the toxicity, mobility or volume of wastes;
c. Short-term effectiveness;
d. Implementability; and
e. Cost.

Examples of the type of information to include are provided below:

a. Long-term reliability and effectiveness: The Permittee may consider whether the technology, or combination of technologies, have been used effectively under analogous site conditions, whether failure of any one technology in the alternative would have any immediate impact on receptors, and whether the alternative would have the flexibility to deal with uncontrollable changes at the site. Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. In addition, each corrective measure alternative should be evaluated in terms of the projected useful life of the overall alternative and of its component technologies. Useful life is defined as the length of time the level of effectiveness can be maintained.

b. Reduction in the toxicity, mobility or volume of wastes: As a general goal, remedies will be preferred that employ techniques that are capable of eliminating or substantially reducing the potential for the wastes in SWMUs and/or contaminated media at the facility to cause future environmental releases. Estimates of how the corrective

measure alternative will reduce toxicity, mobility and or volume of the waste is required and may be accomplished through a comparison of initial site conditions to expected post-corrective measures conditions.

c. Short-term effectiveness: The Permittee shall evaluate each corrective measure alternative for short-term effectiveness. Possible factors to consider are fire, explosion, exposure to hazardous constituents and potential threats associated with the treatment, excavation, transportation and re-disposal or containment of the waste material.

d. Implementability: Information to consider when assessing implementability include:

i) The administrative activities needed to implement the corrective measure alternative (e.g. permits, rights of way, etc.) and the length of time these activities will take;
ii) The constructability, time for implementation, and time for beneficial results;
iii) The availability of adequate off-site treatment, storage capacity, disposal services, needed technical services and materials; and
iv) The availability of prospective technologies for each corrective measure alternative.

e. Cost: The Permittee shall develop an estimate of the cost of each corrective measure alternative (and for each phase or segment of the alternative). The cost estimate shall include both capital and operation and maintenance costs. The capital costs shall include, but are not limited to, costs for: engineering, site preparation, construction, materials, labor, sampling/analysis, waste management/disposal, permitting, health and safety measures, etc. The operation and maintenance costs shall include labor, training, sampling and analysis, maintenance materials, utilities, waste disposal and/or treatment, etc. Costs shall be calculated as the net present value of the capital and operation and maintenance costs.

F. Justification and Recommendation of the Corrective Measure or Measures

The Permittee shall justify and recommend in the CMS Report a corrective measure alternative for consideration by the Department. Such a recommendation should include a description and supporting rationale for the preferred alternative that is consistent with the corrective action standards and remedy selection decision factors discussed above. The Permittee shall also propose a schedule for implementing the preferred remedy or remedies. In justifying the selection of a preferred corrective action alternative, the Permittee shall present summary tables which allow the alternative or alternatives to be understood easily. Trade-offs among health risks, environmental effects, and other pertinent factors shall be highlighted. The Department will select the corrective measure alternative or alternatives to be implemented based on the results presented in the CMS Report.

APPENDIX D – SCHEDULE OF COMPLIANCE

Schedule of Compliance	Due Date
Notification of Newly Identified SWMUs and AOCs Condition V.B.1. and Condition V.B.2.	Within fifteen (15) calendar days of discovery
SWMU Assessment Report Condition V.B.3.	Within ninety (90) calendar days of notification
Notification for Newly Discovered Releases at Previously Identified SWMUs and AOCs Condition V.C.1.	Within fifteen (15) calendar days of discovery
Confirmatory Sampling Work Plan for SWMUs or AOCs identified in Condition V.D.1	Within forty-five (45) calendar days after date of notifying SCDHEC of the discovery
Confirmatory Sampling Report Condition V.D.4	In accordance with the approved CS Work Plan
RFI Work Plan for SWMU(s) and AOC(s) Identified under Condition V.B.4., Condition V.C.2., or Condition V.D.5.	Within ninety (90) calendar days after receipt of notification by the Department which SWMUs or AOCs require an RFI
RFI Progress Reports Condition V.E.3.a.	Quarterly, beginning ninety (90) calendar days from the start date specified by the Department*

Schedule of Compliance	Due Date
Draft RFI Report Condition V.E.3.b.	In accordance with the approved RFI Work Plan
Final RFI Report Condition V.E.3.b	Within forty-five (45) calendar days after receipt of the Department's comments on Draft RFI Report
Interim Measures Work Plan Condition V.F.1.a.	Within sixty (60) calendar days of notification by the Department
Interim Measures Progress Reports Condition V.F.3.a.	In accordance with the approved Interim Measures Work Plan **
Interim Measures Report Condition V.F.3.b.	Within ninety (90) calendar days of completion
CMS Work Plan Condition V.G.1.a.	Within ninety (90) calendar days of notification by the Department that a CMS is required
Implementation of CMS Work Plan Condition V.G.2.	Within thirty (30) calendar days after receipt of the Department's approval of Plan
Draft CMS Report Condition V.G.3.a.	In accordance with the schedule in the approved CMS Work Plan

Schedule of Compliance	Due Date
Final CMS Report Condition V.G.3.a.	Within forty-five (45) calendar days of the Department's comments on Draft CMS Report
Demonstration of Financial Assurance Condition V.H.4.	Within one hundred twenty (120) calendar days after permit modification for remedy
Imminent Hazard Report Condition V.J.1. and V.J.2.	Oral within 24 hours and written within fifteen (15) calendar days of becoming aware of the hazardous circumstances
Waste Minimization Certification Part VI	If Condition VI.A. is applicable, annually from effective date of permit

The above reports must be signed and certified in accordance with R.61-79.270.11.

* This applies to Work Plan execution that requires more than one hundred eighty (180) calendar days

** This applies to Work Plan execution that requires more than one year.

APPENDIX E – WASTE MINIMIZATION CERTIFICATION OBJECTIVES

The Waste Minimization Program should include the following elements:

1. **Top Management Support**

- Dated and signed policy describing management support for waste minimization and for implementation of a waste minimization plan.

- Description of employee awareness and training programs designed to involve employees in waste minimization planning and implementation to the maximum extent feasible.

- Description of how a waste minimization plan has been incorporated into management practices so as to ensure ongoing efforts with respect to product design, capital planning, production operations, and maintenance.

2. **Characterization of Waste Generation**

- Identification of types, amounts, and hazardous constituents of waste streams, with the source and date of generation.

3. **Periodic Waste Minimization Assessments**

- Identification of all points in a process where materials can be prevented from becoming a waste, or can be recycled.

- Identification of potential waste reduction and recycling techniques applicable to each waste, with a cost estimate for capital investment and implementation.

- Description of technically and economically practical waste reduction/recycling options to be implemented, and a planned schedule for implementation.

- Specific performance goals, preferably quantitative, for the source reduction of waste by stream. Whenever possible, goals should be stated as weight of waste generated per standard unit of production, as defined by the generator.

4. **Cost Allocation System**

- Identification of waste management costs for each waste, factoring in liability,

transportation, recordkeeping, personnel, pollution control, treatment, disposal, compliance and oversight costs to the extent feasible.

- Description of how departments are held accountable for the wastes they generate.

- Comparison of waste management costs with costs of potential reduction and recycling techniques applicable to each waste.

5. **Technology Transfer**

- Description of efforts to seek and exchange technical information on waste minimization from other parts of the company, other firms, trade associations, technical assistance programs, and professional consultants.

6. **Program Evaluation**

- Description of types and amounts of hazardous waste reduced or recycled.

- Analysis and quantification of progress made relative to each performance goal established and each reduction technique to be implemented.

- Amendments to waste minimization plan and explanation.

- Explanation and documentation of reduction efforts completed or in progress before development of the waste minimization plan.

- Explanation and documentation regarding impediments to hazardous waste reduction specific to the individual facility.

References:

"Draft Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program", 54 FR 25056, June 12, 1989.

"Waste Minimization Opportunity Assessment Manual", EPA/625/7-88/003, July 1988.